

MOTOR AGE

Vol. XXX
No. 21

CHICAGO, NOVEMBER 23, 1916

Ten cents a copy
Three dollars a year



It Is Easy to Sell the HUDSON SUPER-SIX

*The Largest-Selling Fine Car in the World
Holder of all Worth-While Endurance Records*

To December 1st the 1916 consumer deliveries will have totalled 25,000.

There was a time last summer when dealers in less *wanted* cars did a thriving business. Such dealers are apt to have misjudged then the importance of having the right car in effecting their sales. For all must recognize the **Hudson Super-Six** as the most *wanted*, easiest selling car above \$1000.00 the industry has known.

No car has ever established such records. No car has ever proved such superiority.

Now that the season is past, when dealers in other cars are not doing so well, haven't you noticed that Super-Six sales still exceed Hudson production? October and November retail deliveries exceed those of June and July. That they are not larger is due solely to the limit of the factory production. Dealers should not overlook the importance of their having a *wanted* car. If they must "sell every car they handle, the business cannot be profitable."



HUDSON MOTOR CAR COMPANY
DETROIT, MICHIGAN

We do not advertise for dealers to make up the Hudson organization. We are too particular in our choice to rely upon such a manner of recruiting the kind of men we want in this organization. But we do want to meet real automobile merchants. Perhaps sometime our acquaintance may be of mutual advantage.

HUDSON SUPER-SIX

Stewart Products



Stewart
Speedometer
for Fords
\$10



Stewart
Motor Driven
Warning Signals
\$6



Stewart
Tire Pump
\$12



Stewart
Hand Operated
Warning Signal
\$3.50

No Dull-Winter-Season for Stewart Products

Stewart Products have a sale the whole year 'round—365 days in the year. A dull-winter-business period is unknown to Stewart Products.

A Stewart Speedometer is just as necessary in winter as in summer.

A Stewart Warning Signal is indispensable for winter driving, when cars are enclosed.

The Stewart Vacuum System facilitates starting in cold weather—provides the only gasoline feed.

A Stewart Tire Pump is certainly needed in the winter time.

Every engine needs a set of Stewart V-Ray Spark Plugs. A big, fat spark—intense and unfailing—is assured. Makes starting easier and insures smoother running of the motor.

Motoring is rapidly losing its seasonable aspect. No longer is the automobile for summer use only. This winter at least 75% of the automobiles will be in use most of the time. Comparatively few cars will be put up for the winter.

Can't you see the possibilities for a big winter business on Stewart Products?



Stewart-Warner
Speedometer Cor'n
CHICAGO, U. S. A.



Stewart
Speedometer
\$25



Stewart
Spark Plug
\$1



Warner
Auto-Meter
\$50



Stewart
Vacuum
System
\$10



MOTOR AGE



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SUBSCRIPTIONS received up to the 15th of the month begin with first issue of that month; those received later, start with the first issue of following month.

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ANNOUNCEMENTS

In the next issue of Motor Age will be featured electric lighting and starting systems. Late developments will be explained and the maintenance and care of these units will be told in detail.



The Dutch Girl Says—

"If you are not getting 3,500 to 5,000 miles of service from your tires, it is because you are not using discretion and DUTCH BRAND Products."

DUTCH BRAND

Moisture entering the tire carcass through small cuts is one of the greatest tire destroyers. Neglected small cuts make big tire bills. The standard preventive is

"2-in-1" TREAD FILLER A Liquid Rubber

It quickly fills small cuts and bruises—keeps water, oil and sand out indefinitely. Dries quickly. Resilient.

DUTCH BRAND Auto Patching Cement

Is most dependable for tube patching. Patches stick and stay stuck. Unaffected by heat, friction or car weight.

DUTCH BRAND Vulcanizing Cement

should be a part of the emergency equipment of every car owner who uses a small portable vulcanizer. Cures quickly, evenly and effectively. Also unexcelled for shop use.

Other DUTCH BRAND Tire Savers

Rubber-Seal, permanently repairs large cuts and gashes in outer casings. Rim-Coat ensures quick and easy tire changes. Tire-Talc and Friction-Tape are toolbox necessities.

DUTCH BRAND Products are easily applied by anyone. Supplied in various sized containers for everyone's requirements. Quality considered, the prices are exceedingly low.

Obtainable at most good garages, repair shops and supply stores. DEALERS: Stock from your jobber today.

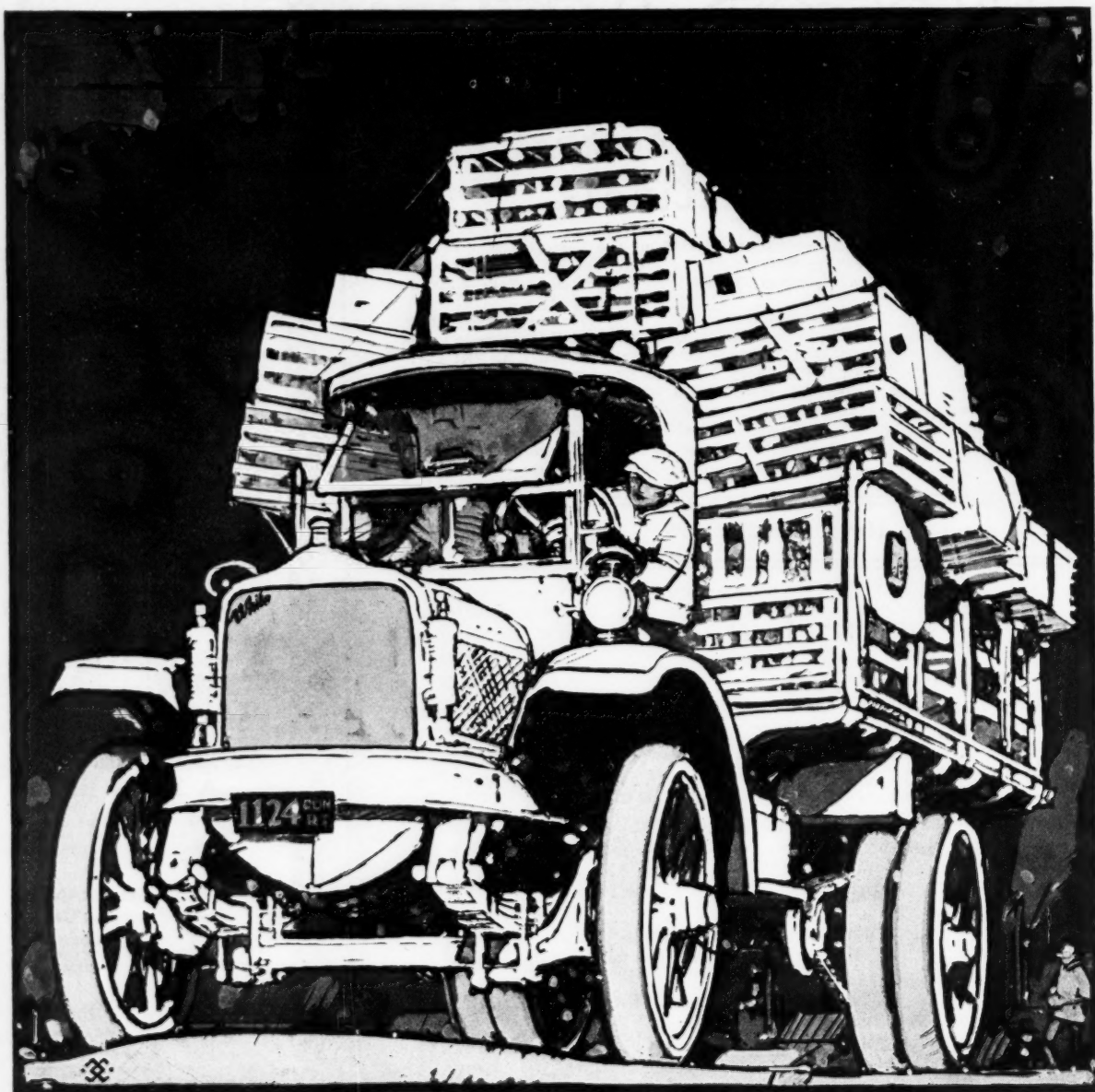
Van Cleef Brothers

MANUFACTURERS

The Rubber Cement
Authorities

7711 Woodlawn Ave., Chicago





WHITE TRUCKS

A SUPERIOR product is not the whole advantage in dealing with The White Company. Its wide and varied experience, covering the special transportation problems of thousands of motor truck users, is an asset second in importance only to the product itself.

There are more White Trucks put into service each year than trucks of any other make, and furthermore, this predominance is nation-wide, among all classes of users.



THE WHITE COMPANY
CLEVELAND



MOTOR AGE



Tractors Haul Europe's Guns

Motor Vehicles Supplant Horses in Artillery Divisions, Who Depend on Them for Ammunition



Rough going for a Renault tractor near the firing line

FROM the time guns were invented until the opening of the present war, the only known means of hauling artillery was by horse traction. In the various small wars prior to the present conflagration use had been made of armored cars, carrying machine guns or very light artillery, but there does not appear to have been a single instance of the use of the internal combustion motor for the haulage of heavy artillery. So far as the French army is concerned, it was only on the eve of the war that the military authorities had finally decided on the adoption of the four-wheel drive tractor for hauling big guns.

It is not necessary to state in what proportions horses have been replaced by tractors in the present war. This much is certain, however, all the more difficult artillery work can be done by gasoline tractors better than it can be performed by horses, and there are no positions accessible to horse teams which cannot be reached by mechanical means. Notwithstanding this, military experts are of the opinion that the horse will always be retained for certain classes of artillery work, notably for the haulage of the lighter guns. It must be remembered too, that it is easier to convert material than to change officers and men. Long training makes it possible for

By W. F. Bradley

Motor Age's Special War Correspondent



A comic artist from the Folies Bergere music hall adds to the camp's gaiety at his post of storekeeper for a French tractor school

men to get better results out of old-fashioned material than it would be possible for them to secure for a certain length of time with a more modern material.

There is no secret about the types of tractors used in the French army. They were all described in detail early in 1914—before the war clouds had begun to form—and they have only been changed in detail since then. To the four French makes—Panhard, Renault, Latil and Schneider—have been added the Jeffery quad and some Holt caterpillar tractors. It is not possible to make close comparisons between the Jeffery quad and the three leading French makes, Panhard, Renault and Latil. The Jeffery is a lighter tractor without a winch. There are many conditions where the most powerful tractors can only reach commanding positions by hauling themselves up the hillside by means of the winch and then hauling their guns up in the same way.

Expert opinion tends towards the belief that the final type will be the four-wheel drive tractor similar to the Panhard, Latil and Renault. Owing to its lower pressure per unit of area the caterpillar can travel over soft ground inaccessible to the four-wheel driver, but this advantage is offset by its destructiveness of made road surfaces, and officers who have had charge



This is a difficult drive made by a Jeffery quad

of both types for hauling artillery boast that with their four-wheel drivers they can do anything possible of attainment with a caterpillar. Another type of tractor is represented by the Knox, the Fiat and Isotta-Fraschini in Italy, and the Daimler-Forster in England. All these have been used in the war and important data exists regarding them. They are all, however, rear-wheel drivers, and as such incapable of doing some of the work possible with the four-wheel driver, or, as the French term them, total-adherence tractors. All the four-wheel drivers mentioned above drive and steer at both ends. For a given wheelbase they have a turning radius considerably smaller than that of any rear-drive truck. There are, however, disadvantages in steering at both ends, for it sometimes happens that on very difficult hills the front wheels will get in one track and the rear wheels in another, making it a very difficult matter to move the vehicle. Such a condition only arises with the combination of a very steep hill, rough surface and no width to turn. Because of this, one firm has produced a four-wheel driver steering at the front only.

Tractor Crews Trained

An interesting feature in connection with the four-wheel drive tractor development is the training of crews to handle these vehicles. Quite independently of its truck and touring schools, the French army has a special organization for the training of sub-officers and men in the driving and handling of tractors attached to heavy batteries. While it is a comparatively easy matter to train men to handle ordinary trucks on made roads, and not exceptionally difficult to transform an intelligent soldier into a first-class chauffeur, it is a somewhat elaborate process to produce men capable of getting the best results out of tractors.

It is the conviction of the officers in charge of this school that a four-wheel drive tractor can go anywhere, providing the surface is sufficiently resistant to carry the weight of the vehicle. But to pass through a forest, to climb over clumps of trees, to get up a 30 per cent gradient of

natural earth, to slide a gun down a 60-degree embankment and haul it out again calls for considerably more experience than the turning of a steering wheel and the moving of a couple of levers.

While many of the men received at the tractor school have had previous automobile experience, every profession and every grade of life is represented. A glance over the docket of the men received for training revealed a comic artist from the Folies Bergere music hall—incidentally he con-

tributed to the gaiety of the army—an opera singer, a professional photographer, a working tailor, a solicitor, a footman, a taxicab driver and a man of independent means. Naturally, their ability is varied, but the material being of good quality and a spirit of emulation existing among the men, it is possible to make them all fit for artillery tractor service.

If the pupil has never previously driven an automobile, it is found that 15 days instruction on an ordinary truck are sufficient to make him a passably good driver. After this he goes to the tractor section, and at the end of three weeks, on an average, is fit to be sent out to the armies in the field. In addition to his personal record card, each pupil entering the school is given a progress card divided into thirty-one numbered squares representing the days of the month. At the end of each day the number of points awarded by the instructor is recorded on the card, thus forming a permanent record of the progress made by the man during his stay in the school.

The driving instruction is of an intensely practical nature. In the neighborhood of the school is a large amount of very hilly forest land with a clay soil difficult to operate on after rain. The tractors distribute themselves in this forest, each vehicle having a dozen pupils aboard and be-



Tractors furnish the power by which this gun is being pulled uphill



Some of the "roads" the tractor on the European front follows

ing in command of a couple of sub-officers. The superior officers move about from group to group, supervising the general work and giving instructions as necessity arises. When I was introduced to this school two Renault tractors were coming along a mud track by the side of a lake. Although weather conditions this day were fairly good, there were about 8 inches to 1 foot of mud before solid earth was reached. A sharp right-hand turn brought the tractor into the forest, on a narrow steep track just wide enough for one vehicle. The gradient being only about 10 per cent, the tractor worked its way along slowly, with a trailer in tow, without any difficulty.

Tractors Climb Hills

After the 10 per cent gradient came a level portion, then a 32-per cent gradient for a distance of 150 yards, the track being rough earth with either high banks on each side or thick forest growth. The trailer was unhitched and left at the bottom of this hill, the tractor advancing alone and paying out cable as it proceeded. The differential was locked, the sprag was dropped, and two of the crew placed behind with big blocks of wood to scotch the wheels. On the most difficult portion a partially-choked gasoline feed pipe caused a stoppage of the motor and necessitated quick work on the part of the men with the blocks of wood. When the full length of cable had been paid out, the brakes were set, the wheels blocked and the winding drum put into engagement. Slowly the trailer was hauled up, the instructors meanwhile giving attention to the men who were handling the cable on the capstan and the winding drum, and also to the crew of the two men aboard the trailer. With only a few yards to go, and while on the steepest portion of the hill, the cable snapped. Quick work with the

brakes prevented a mishap and the incident was taken advantage of to give a lesson in making knots. The climb was accomplished with locked differential and chains on all four wheels. The previous day, after a heavy rain, it had only been possible to climb this hill by the use of block and tackle attached to a stout tree, and when the first tractor reached the summit it had to help haul up the second one. Owing to the narrow width available, it is doubtful if horses could have got any load up this hill by direct haulage. In any case, animal traction would have been much longer and would have required a greater force of men than mechanical traction.

After some work under easier conditions, but all over forest dirt roads, the crew was taken to a hollow resembling a huge shell hole. A Jeffery was found at work with a number of sub-officers who were being given a superior training to fit them for the handling of tractor crews. Here an officer gave a demonstration of how to take advantage of the nature of the ground. Sliding the tractor down the steep bank until it looked as if the tractor would stand on its nose, he attempted to come up the steepest portion of the bank. The first three attempts failed, the tractor attaining an inclination between 40 and 45 degrees and the motor then stalling. The causes of the failures were pointed out for the benefit of the pupils and other attempts made until after considerable difficulty the Jeffery reached the top of the bank. The private soldiers then went through the same tests with a Renault and a Latil tractor.

Instruction Is Practical

To get as near to actual war conditions as possible, a heavy gun was taken into a hollow assumed to be a suitable emplacement for firing on a distant enemy and the pupils instructed how to get it up a 60-degree banking with soft surface and only just sufficient room to pass between the

trees. This maneuver could only be accomplished with the use of a couple of tractors, both using their winches, and a considerable amount of block and tackle. It was explained to the men how to place the tractors and the tackle so as to use the available power to the best possible advantage. While some of the easier driving tests are being carried out, those members of the crew not required aboard are left at some convenient point and given a lesson in making knots, in splicing and in fitting up block and tackle, for it is recognized that much of the value of a tractor lies in the ability of the men to use the machine intelligently.

Officers Are Skilled Drivers

Sub-officers, who will later command tractor teams, are given an entirely separate training. It is required that these men shall be really skilled drivers, capable of taking a tractor over the wildest kinds of country, and of giving an example to the men of both skilled and daring driving. Great attention is also paid to their theoretical instruction, lectures being given them on application of tractors to the haulage of artillery, and they are also made to spend a few weeks as apprentices in the factories manufacturing the army tractors. It is thus certain that they will possess a complete mechanical knowledge of the vehicles which will later be placed in their charge.

When an artillery battery is motorized it becomes entirely dependent on gasoline for its ammunition and other supplies. Thus, during the period of training, it is not necessary to haul a gun on every occasion; cases of sand can represent shells, food, gasoline, chains and other equipment which under actual war conditions must be taken to the gun with unfailing regularity. At the same time, the driving over rough and torn ground prepares for future shell-torn fields, over which the drivers may have to guide the tractors.



An Italian tractor used by French artillery

Jackson Highway Officials Decide Route

Southern Connections to New Orleans to Be Through Mississippi

LOUISVILLE, Ky., Nov. 20—Special telegram—After a heated discussion, directors of the Jackson Highway Association, in conference at the Seelbach Hotel, this afternoon decided to adopt what is known as the Mississippi route from Nashville to New Orleans. The rival route, called the Alabama route, received ten votes, while the Mississippi route received fourteen votes.

The Mississippi route, recommended by the pathfinding committee in a report after a trip over the roads in both states in October, leads through Florence, Ala.; Columbus, Miss.; Meridian, Miss.; Hattiesburg, Miss.; Poplarville, Miss.; thence to New Orleans. This is the same route recommended by the representative of Motor Age, who made the trip with the pathfinders. It was suggested by Peter Lee Atherton, president of the organization, that an additional arm of the Jackson highway extend south from Nashville, Tenn., via Shelbyville, Tenn.; Fayetteville, Tenn.; Huntsville, Ala.; Birmingham, Ala.; to Montgomery, Ala. Advocates pointed out that this proposed arm of the Jackson highway would not detract tourists from the Mississippi route on their way to New Orleans and would attract motorists on their way to Florida.

Another meeting of the directors will be held at Birmingham, Ala., within 90 days to decide this question. Before adjournment a vote of thanks was extended to Motor Age for the interest and support this publication has given and is giving the Jackson Highway Association. A communication has been received by Mr. Atherton from the secretary of the Sheridan Road Improvement Association, Chicago, which has jurisdiction over the road that extends from Chicago to Milwaukee, re-

questing that Sheridan road be made a part of the Jackson highway, but no action was taken on the matter at today's meeting.

HERMAN WITH BOUR-DAVIS

Detroit, Mich., Nov. 20—L. G. Herman has been appointed production and factory manager of the Bour-Davis Motor Car Co. Mr. Herman was formerly with the Rutenber Motor Co.

MACEY HARROUN SALES MANAGER

Detroit, Mich., Nov. 20—J. W. Macey has been appointed sales manager of the Harroun Motors Corp. Mr. Macey was formerly with the Ford Motor Co.

TAYLOR WITH WHITE STAR

Detroit, Mich., Nov. 20—Kirk Taylor has been appointed sales manager for the White Star Refining Co. Mr. Taylor was formerly with the Evapco Mfg. Co.

PETTIT TO LEAVE CASE T. M.

Racine, Wis., Nov. 21—F. R. Pettit, Racine, Wis., has been elected vice-president of the J. I. Case Plow Works of this city and will take up his new position January 1. Mr. Pettit is at present general purchasing agent for the J. I. Case Threshing Machine Co.

SPECIAL CAR RATES TO COAST

Los Angeles, Cal., Nov. 20—The Tourist Association of Central California, this city, has arranged to take a trainload of private touring cars from New York and Chicago to San Francisco to enable owners of cars to see and enjoy California at a minimum amount of expense and trouble.

By thus grouping together the cars of many owners and shipping them all at the

same time, the carload rate of \$3.30 per 100 pounds, from New York to San Francisco, and of \$3 from Chicago to San Francisco, has been obtained. There will be a moderate charge on each car for loading, blocking, attending to shipment, etc., at New York or Chicago, and unloading and caring for the machines at destination. The rates on motor cars when shipped singly are \$7.40 per 100 pounds from New York and \$6.80 from Chicago.

The special train carrying the machines will leave New York February 24. Another will leave Chicago on February 28. These trains will reach San Francisco on or about March 10. Free storage for 2 days at San Francisco will be allowed when the owner cannot take delivery of his car.

CHANGES AT PACKARD

Detroit, Mich., Nov. 20—Arthur E. Cordin has resigned from the Packard Motor Car Co. to join the Pluyn-Ochs Co., importer into Russia of motor cars and accessories. Mr. Cordin, who has been assistant sales manager for the Packard company for the past 6 years, will go to Petrograd to organize a branch for the Pluyn-Ochs Co.

H. H. Hills, sales manager of the Packard company, has been appointed assistant general manager. C. R. Norton, manager of truck sales, has been made general sales manager. G. R. Bury, manager of carriage sales, has been promoted to the position of assistant general sales manager. These promotions follow the resignation of Mr. Cordin.

The company also will make appointments to meet the vacancies caused by the resignations of E. H. Belden and W. R. McCulla. No promotions have been made yet, but it is said that the vacancies will be filled by men new with the organization.

BUYS TABERNACLE FOR SHOW

Detroit, Mich., Nov. 20—The Detroit Automobile Dealers' Association has purchased the Billy Sunday tabernacle for the motor car show to be held January 20-27. The association has pledged itself to an expenditure of \$50,000 to pay for the flooring and a heating plant. Approximately 70,000 square feet of floor space will be available. Drawings will be made by association members November 27 and space will be allotted to non-members at a drawing December 4.

The tabernacle is in the heart of the city, easily accessible to the public, and from 20,000 to 25,000 can be accommodated daily.

WORCESTER SHOW OPENS

Worcester, Mass., Nov. 20—The second annual motor car show held under the auspices of the Worcester Automobile Dealers' Association, opened here today and will continue throughout the week. It is a much larger show than the one last year. All seekers after space could not be ac-



Locomobile truck pulling out of a ditch in Mexico. It is in the service of the government with the troops

commodated at the Casino; so an overflow is at the Hotel Bancroft, using the big ballroom.

There are twenty-six makes at the Casino and twelve at the hotel. The cars in the Casino include the Jackson, National, Maxwell, Apperson, Chevrolet, Saxon, Paterson, Chandler, Cadillac, Chalmers, Mitchell, Packard, Buick, Hudson, Stearns-Knight, Haynes, Empire, Metz, Ford, Oldsmobile, Oakland, Paige, Dodge Bros., Overland, Willys-Knight and Elgin. At the Bancroft are the Grant, Oldsmobile, Packard, Jordan, Biddle, Velie, Inter-State, Owen-Magnetic, Hudson, Saxon, Peerless and Buick.

DETROIT CLUB ADDS MEMBERS

Detroit, Mich., Nov. 20—The New Detroit Automobile Club, which is making a campaign for additional members and reports that 150 applications were received last week.

PAIGE TO INCREASE PRICES

Detroit, Mich., Nov. 20—The Paige-Detroit Motor Car Co. will increase the prices of its cars on Jan. 1, 1917. Prices at this time are: Fairfield model, seven-passenger, \$1,375; Fleetwood model, \$1,090; Dartmoor model, roadster, \$1,070; Six-51 sedan, \$2,300; Six-51 coupe, \$2,100; Six-51 limousine, \$2,750; Six-51 town car, \$2,750; Six-38 sedan, \$1,775.

STUDEBAKER PRICES RISE

Detroit, Mich., Nov. 18—On December 31, 1916, prices of Studebaker delivery models will go up \$50 on the 1,000-pound model and \$100 on the 1-tonner. This increase has been made necessary to cover the increased cost of practically all materials entering into their construction. Following are the old and new prices:

	1916	1917
1,000-pound chassis	\$ 785	\$ 850
Panel	875	925
Express	850	900
Station	875	925
2,000-pound chassis	1,100	1,200
Stake	1,250	1,350
Express	1,200	1,300
Bus	1,400	1,500
With seat	1,150	1,250

NEW KISSELKAR PRICES QUOTED

Hartford, Wis., Nov. 21—The new prices of Kissel hundred point six models, which are to cost more after December 1 as previously announced, are as follows: Five-passenger touring car, not built for all-year top, \$1,195 instead of \$1,095; three-passenger roadster, not built for all-year top, \$1,195 instead of \$1,095; five-passenger Gibraltar touring car, built for all-year top, \$1,285 instead of \$1,195; four-passenger Gibraltar touring car, built for all-year top, \$1,285 instead of \$1,195; five-passenger Victoria with detachable town car top, \$1,950 instead of \$1,850; five-passenger all-year sedan, including summer top, \$1,635 instead of \$1,520; four-passenger all-year coupe, including summer top, \$1,635 instead of \$1,520. Five wire wheels will be included in the equipment for \$100 extra.

Empire Tire Completes Refinancing

Production Will Be Increased—Annual Sales Now About \$800,000

NEW YORK, Nov. 20—The Empire Tire and Rubber Corp. has completed negotiations for reorganization and refinancing by incorporating under the laws of the States of Virginia to take over the business of the Empire Rubber and Tire Co., established in Trenton, N. J., in 1887. The new company has a capital consisting of \$1,500,000 7 per cent cumulative convertible preferred, par value \$100, and \$4,500,000 in common, par value \$10. Of the authorized common \$1,500,000 is to be reserved for the conversion of the preferred stock. The underwriting was done by Andrews & Co., this city, who are offering for public subscription \$1,500,000 preferred, which is convertible into an equal amount in par value of common, ten shares of common for one share of preferred, at the option of the holder at any time after June 30, 1917, and prior to July 1, 1920. It is also offering for subscription the preferred stock with a privilege of subscribing to four shares of common at \$4.50 per share, the common to be repurchased by the underwriting syndicate at \$6 per share.

The company has recently increased its production to 1,500 tires per day, and with a small additional expenditure this can be increased to 2,000 tires per day. The sales of mechanical rubber goods now average about \$800,000 per annum, and the new capital will enable a more vigorous manufacturing and sales policy so that the sales in this department should be doubled. New business of from \$2,000,000 to \$2,500,000, it is stated, will be had through the new affiliations, making a total with the business it is now doing, of over \$5,000,000 per annum, on which the company should show profits of \$600,000 to \$700,000, or approximately 12 per cent on gross sales.

DUPLEX TRUCK CO. ORGANIZED

Detroit, Mich., Nov. 20—The Duplex Truck Co. has been organized to take over the Duplex Power Car Co. of Charlotte. The new company will move the business to Lansing, where a site for a factory will

be purchased. The concern is capitalized for \$1,000,000. H. M. Lee, assistant sales manager of the Reo company, is president and general manager; H. E. Bradner, vice-president, and Geo. W. Hewitt, credit manager of the Reo company, secretary and treasurer.

PAIGE-DETROIT INCREASES CAPITAL

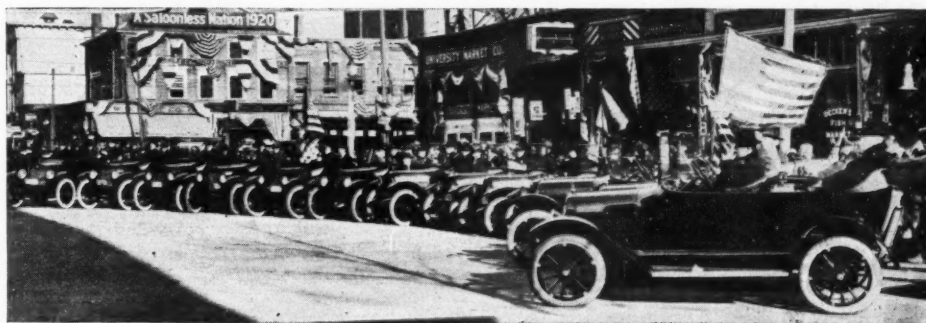
Detroit, Mich., Nov. 21—The Paige-Detroit Motor Car Co. has increased its capital from \$2,000,000 to \$3,500,000. This has been done by the addition of 7 per cent cumulative preferred stock to the present capital, which is wholly common stock. The new, preferred stock will have a par value of \$100.

COMMERCE STOCK ON EXCHANGE

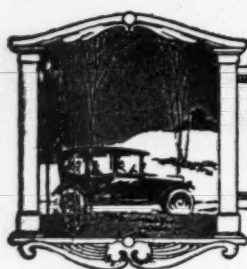
Detroit, Mich., Nov. 20—The stock of the Commerce Motor Car Co. was listed on the Detroit exchange November 18. The company, which was organized in 1911 to manufacture trucks, has an authorized capital of \$400,000, of which \$300,000 is now outstanding. No cash dividends have been paid, but a stock dividend of 50 per cent was paid December 31, 1915, and another stock dividend of 33 1/3 per cent was paid September 5, 1916.

NEW TRACTOR COMPANY FORMED

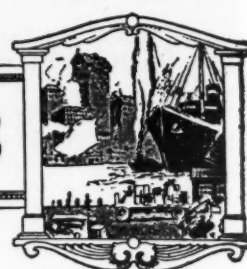
Detroit, Mich., Nov. 16—The L-M-H Development Co. has been formed as a holding company capitalized at \$30,000 for the development and construction of a tractor, an invention of H. M. Leonard. Incorporators are John Hurlburt, Detroit, H. M. Leonard, who has been chief engineer of the Duplex Power Car Co., Charlotte, Mich., and Clarence Martin, Jackson, Mich. It is later planned to organize a larger company. Mr. Leonard claims that his new tractor will run equally well in either direction and has four speeds forward and back, that it will turn in a circle, the radius of which is its wheelbase, and that it will pull three plows. It is a four-wheel drive, weighs 3,300 pounds and will sell for \$800.



Fleet of Maxwells that handled G. A. R. veterans in Boston parade



EDITORIAL PERSPECTIVES



Approaching Tire Ideals

THE ideal tire is one, all of whose parts will last the same length of time; one which, like the "one-hoss-shay" will wear out, when it does wear out, all at once. This means maximum tire service and minimum tire maintenance expense. It is this ideal toward which tire makers are striving. When this ideal is a fact, we will have a tire in which the carcass will last as long as the tread and the tread will not be worn out before the carcass is destroyed. This ideal may be called the truly balanced tire and it is toward this ideal that tire makers are working. Better balance is evident in this year's tires than in previous ones and consequently there is less perfectly good but unusable tread rubber going to the junkman.

PROBABLY the greatest growth of the year in the tire industry has been in the cord tires and if tire manufacturers are correct, another twelve-month will see cords as regular equipment on most cars selling at \$1,500 or over. Not only has the use of the cord tire become much more widely extended than in previous years, but there is a much larger number of tire factories preparing to turn out this type than there was a year ago.

GREATER resiliency, lower inflation pressure without damage and consequent longer life are the chief features in which the cord tire may claim advantage over the older type of construction which characterizes the fabric tire. The carcass of a tire is its limiting factor so far as its life term is concerned, and, neglecting injuries from cuts, etc., failure comes through the continual bending of the side wall which causes the plies to separate in time. The chief advantage claimed for the cord tire is that inasmuch as the carcass of a cord tire is more nearly a unit than that of the fabric construction, it will withstand a great deal more of this bending than will a fabric tire, before there is any great tendency on the part of the plies toward separation.

IT is this characteristic of the cord tire—that its carcass has as long life as the tread, even if improperly inflated—that makes it a balanced tire and makes it a valuable addition to the tire field in spite of its increased cost. So far as the factor of cost is concerned, there is little chance that it can be made to sell at the price of fabric tires, because the manufacturing cost is greater.

Measured by Standards

WHY should we not have standards of truck performance, and truck costs? We have standards of measurement, the inch, foot, yard and mile. We have our standards of weight, including the ounce, pound and ton. We have standards of speeds—speed for walking, for running, hours speed, motor-car speed, train speed, steamboat speeds, etc. Our engineering societies are arranging standards for their work, in short, a criterion of progress of any people generally can be its standards adopted for measurement of human effort along various lines.

IN THE motor truck industry, why not standards of what a 1,000-pound delivery wagon will do in the house-to-house delivery field? Why not set up some figures that represent the true average, number of miles possible per day, number of parcels delivered, amount of gasoline consumed, cost of tires, and cost per package for delivery?

WE DO not argue that you can adopt a standard that will apply to every condition—that is not the object. The majority of people know wherein one business differs from another, they know wherein costs of doing work vary, but these variations constitute no broad reason that such performance standards should not be set up. These standards would be beacon lights, marks to shoot at, trail blazers in the development of individual business transportation.

SUCH standards could be distributed broadcast. Reaching the hands of prospective buyers, they would afford some ground for buying judgment. They would often afford more definite information than the salesman gives.

SUCH standards could be revised from year to year. It takes a long time to evolve definite and fixed standards and it is never expected that a fixed standard such as the foot or pound would be adopted for measuring truck performance. Standards of performance are constantly varied, but the variation does not injure the value of them. We are constantly raising the standard of motor car speed, we are raising the standard

of golf games, are raising the standards of steamboat speed, are revising standards of business terms of credit, in short, we are constantly revising standards.

WE HAVE a standard value for money in all countries. In one land money is worth 6 per cent per annum, in another it is worth 8. As conditions change these rates of value rise or fall, but these variations do not weaken the value of a standard. So it would be in the truck performance field.

CO-OPERATION is essential in the truck industry. Without co-operation there will be much useless work done, work done today that will be blotted out tomorrow. Glance over the last 16 years of motor car development and consider the many things done and many efforts made that are now forgotten, works that were not in any sense in conformity with the great canvas of the passenger car industry that has been receiving master touches for the last 20 years.

IF ANY changes have to be made in the character of a gasoline or a kerosene the change should be discussed by both fuel maker and truck maker. The fuel maker should not make the change July 1 and not give the truck maker any notice that on that date a different grade of fuel is going on the market. Fuel makers should let truck makers know perhaps a year in advance. By co-operation of the two industries, team work is possible. Let our truck makers take up such steps rather than fight each other along questions of design, which are minor compared with the fuel.

THE last word has not been uttered in motor truck tire equipment. The story is in its early stages. There are questions of reducing the number of tire sizes, changing the cross-section of tires, settling the relative fields of single and dual types for rear wheels, determining what are permissible loads to be carried on each square inch of tire surface contacting with the road. These questions are pertinent. They appeal very forcibly to the pockets of the buyers.

Pennsylvania and Delaware at War

Reverse English Reciprocity Brand Handed by Each to the Other

OPEN warfare has been declared by Pennsylvania against Delaware in the matter of motor reciprocity, according to news dispatches received last week from Harrisburg, which stated that the highway department has given notice to the authorities of Philadelphia and to all towns in Delaware County, Pa., that their police officials should stop all Delaware cars used for commercial purposes and notify them to get Pennsylvania registration.

Two years ago the Delaware legislature amended its law to require commercial vehicles from other states to have Delaware registration. This was because Pennsylvania concerns sent their cars into Delaware every day without spending any money in the state or doing anything toward the upkeep of the roads. Vehicles owned by individuals were excepted from this provision. However, the amendment in the law has resulted in the arrest of many drivers from other states and some heavy penalties and embarrassment, because many did not know of the law until they came here.

Naturally there was some indignation over this, and, notwithstanding the fact that Pennsylvania's law, being reciprocal, imposed the same restriction on Delaware commercial cars, Delaware motorists did not find Pennsylvania officers, as a class, very lenient.

So Delaware began to ease up and instead of making arrests, for first offenses the police gave warnings, and for some time no arrests have been made under this law, though it is still in force. The Harrisburg dispatch, however, indicates an intention on the part of Pennsylvania to enforce the law to the letter.

It is believed here that the end of the war is in sight, for the Delaware Automobile Association, according to Charles G. Guyer, the secretary, has drawn a bill for presentation to the legislature when it meets in January, amending the law to re-establish the open-door policy and make matters with respect to all motor vehicles thoroughly reciprocal.

On the passage of the proposed amendment, unless Pennsylvania amends its law, harmony will be restored. The only restriction will be that foreign corporations operating cars in Delaware will have to have local registration as is required by a Pennsylvania law for that state.

CO-OPERATIVE ACCESSORY CO.

Salt Lake City, Utah, Nov. 18—Establishment of a co-operative accessory company with 500 Salt Lake City car owners

as stockholders is planned by Deveaux Wilson, owner of the Capitol garage. Wilson is now formulating his plans and will incorporate shortly with a capitalization of \$5,000.

Stock having a par value of \$10 will be sold and no owner will be allowed to buy more than one share. Stockholders will purchase accessories of all sorts practically at cost, Wilson figuring that a 25 per cent reduction on the market price will be possible on many things. His main idea is to raise a working capital and, at the same time, stimulate his business.

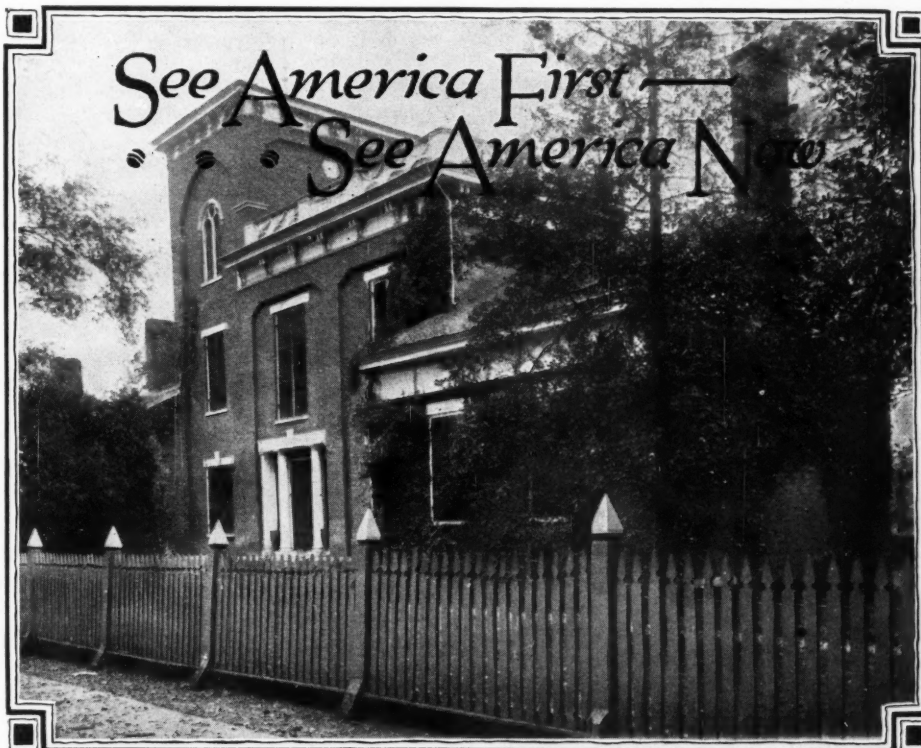
STORM PLAYS QUEER PRANK

Los Angeles, Cal., Nov. 18—During a windstorm that swept across the Mojave desert and through the Cajon pass near San Bernardino a large number of motor vehicles were stalled from a cause that subsequently was assigned to static electricity in the atmosphere. The electrical equipment on all machines became short

circuited so they could not be operated. While the storm was on and owners abandoned their cars to seek refuge, a gang of thieves appeared and began stealing equipment. Special officers were rushed to the scene to hunt for the looters.

MICHIGAN BREWERS HOPEFUL

Detroit, Mich., Nov. 20—Consternation came into the minds of Michigan brewers when they woke up the day after election and found after May 1, 1918, the whole Wolverine state would go on the water wagon. Enter Henry Ford. He suggests that the breweries continue to manufacture alcohol, the only difference being that the alcohol be consumed by motor cars rather than by the owners and drivers of motor cars. A meeting is scheduled at which Ford will unfold his scheme to the brewers and it seems safe to forecast that in the near future, Michigan makers of stimulants will be turning out fuel to run Fords; possibly other cars.



NO. 99—BIRTHPLACE OF JOHN HUNT MORGAN, HUNTSVILLE, ALA.

SOUTHERNERS look upon John Hunt Morgan, famous Confederate raider, as one of their heroes. He was born in the building shown above at Huntsville, Ala., June 1, 1826. It was Morgan who resorted to guerrilla methods of warfare as the best means of serving the Confederacy. The old Morgan birthplace is still in a good state of preservation.

EDITOR'S NOTE—This is the ninety-ninth of a series of illustrations and thumbnail sketches of the scenic and historic wonders of America to be published in Motor Age for the purpose of calling the attention of motorists to the points of interest in their own country.

Resta Is Probable A. A. A. Champion

Unless Aitken Reconsiders Reported Withdrawal from Final Event Italian Gets Speedway Award—Dario Takes Vanderbilt and Johnny Aitken Wins Grand Prize in Wilcox's Peugeot



Death Turn on the palm-lined Santa Monica course during Vanderbilt trophy race. Weightman leading in Duesenberg. The white clouds are oil fumes, not dust, and indicate one probable cause of ignition trouble

RESTA won stellar honors in the Vanderbilt last Thursday and took the lead in points for the championship from Johnny Aitken, who, in a valiant effort 2 days later in the Grand Prize dash, attempted to wrest the laurels from Resta, but inasmuch as he used his teammate's car to turn the trick he was denied the 1,000 points that were to be accorded the winner. Wilcox, whose Peugeot Aitken drove to victory in the Grand Prize, was given 416 points, his pro rata for driving twenty laps, but the remaining 584 points were denied Aitken and no one gets them. Aitken has a possible chance to overcome Resta's 660-point lead if he can win the Ascot race which carries 700 points, provided Resta does not take any points in this event. Just as this is going to press word comes from Los Angeles saying Aitken has departed, ostensibly for Indianapolis, but his car is still in Los Angeles. He has said he will not drive at Ascot November 30, but racing officials are not inclined to take his statement seriously. Goodrich has announced the split of its \$10,000 prize, \$5,000 to Resta, \$3,000 to Aitken and \$2,000 to Rickenbacher.

HOW THEY FINISHED IN GRAND PRIZE

Driver	Car	Time	Speed
Aitken-Wilcox	Peugeot	4:42:47	85.59
Cooper	Stutz	4:48:99	83.74
Patterson	Hudson	5:09:38	78.13
Roads	Hudson	.....	.....
Weightman	Flagged		

HOW THEY FINISHED IN VANDERBILT CUP

Driver	Car	Time	Speed
Resta	Peugeot	3:22:48	86.9897
Cooper	Stutz	3:30:40	83.74
Weightman	Duesenberg	3:42:00	79.46
Roads	Hudson	3:54:45	75.2
Patterson	Hudson	Flagged	
Vail	Hudson	Flagged	

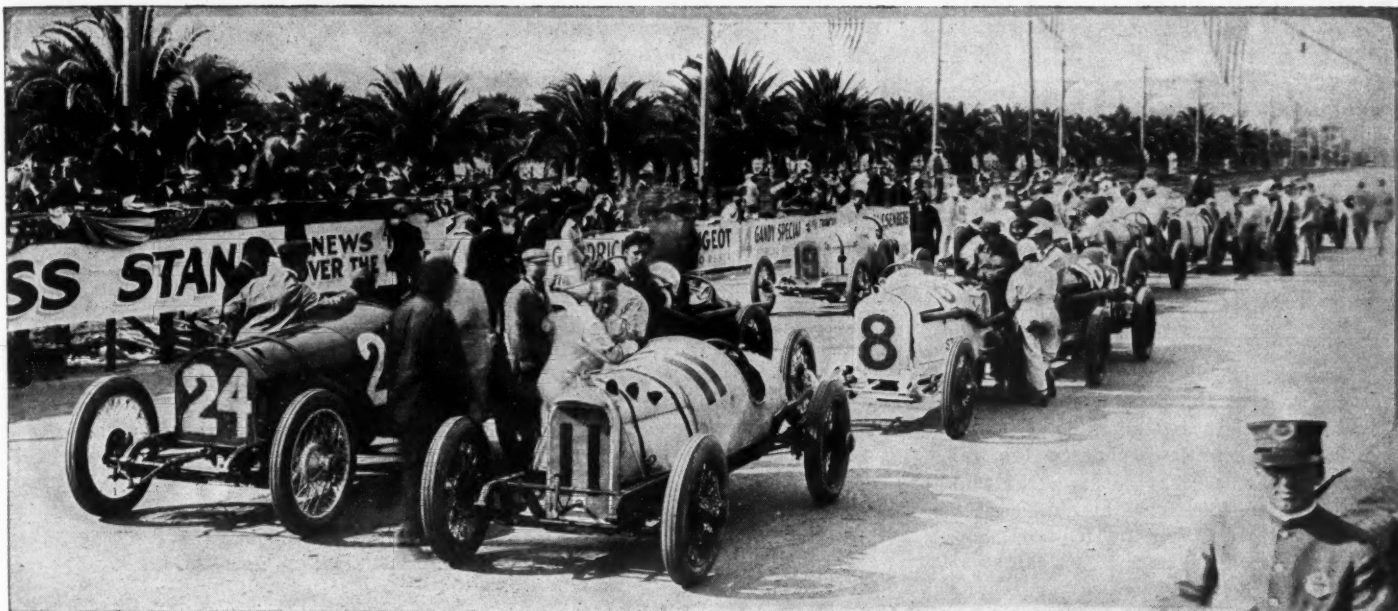
SANTA MONICA, Cal., Nov. 18—Special telegram—Complex is the word that quite appropriately applies to the running, finishing and managing of the seventh International Grand Prize race run here today. Races have been run in which it has been difficult to declare a winner by reason two cars finishing apparently even, but the Grand Prize is an exception and while Johnny Aitken is the apparent winner, credit and points in the American

By Roy H. Compton

Automobile Association championship standing may go to his teammate, Howard Wilcox. The safest thing to say until difficulties have been ironed out is that a Peugeot car, driven 403.249 miles, won the race in 4 hours, 42 minutes and 47 seconds, averaging 85.59 miles per hour, setting a new record for the Grand Prize race and piloted twenty laps of the 8.04

mile course by Howard Wilcox and the remaining twenty-eight laps by Aitken.

The establishment of a new world's non-stop road race record by Patterson in a Hudson, and the setting of a new time record for the Grand Prize event was marred by one of the worst accidents that has happened in motor car racing for a number of years, and this accident together with the wrangle over the award of championship points and also complica-



Lining up for the start in the 1916 Vanderbilt at Santa Monica

tions of management marked the Seventh International Grand Prize as being more exciting than any of its predecessors.

Trouble brewed with the Grand Prize race several days ago when William K. Vanderbilt let it be known that rules of the Automobile Club of America, under which the race has been run since its inception, were at variance with those of the American Automobile Association. Especial attention was called to the rules of the Automobile Club of America, but this event, not being strictly international, was run under A. A. A. sanction and not the A. C. A.

Twenty-one Cars Start

Twenty-one cars started, with Resta in his Peugeot taking the lead and turning the first lap at an average of 86.36 miles per hour. Aitken's Peugeot limped into the pits at the end of the first lap with a broken piston, Aitken being in third place when he went out. There was a hasty consultation in the Aitken-Wilcox camp and as Wilcox passed on his fifth lap, he was signalled to stop. It became quite evident that an attempt would be made to put Aitken in Wilcox's car because of a possible chance of Aitken's winning the championship on points, Resta having taken the lead from Aitken by winning the Vanderbilt cup race last Thursday. Much depended on today's race if Aitken was to overcome Resta's lead in points. Wilcox came in at the end of the ninth lap, said he was tired, and asked to be excused, but Referee J. B. Brady refused permission.

At the end of the tenth lap, Resta was still setting the pace at an average of 86.7 miles per hour. Wilcox lost 2 minutes when he stopped to ask relief, and held second position at this time and up to the fifteenth lap when he took the lead, his average at that time being 87 miles per hour.

Death and destruction came in lap No.

13 when Lewis Jackson, driving a Marmon, lost control of his car while traveling at approximately 100 miles per hour on San Vincente Boulevard, the machine hurdling into the concrete curb splintering two trees, one of which fell on a mov-

A. A. A. Championship Standing

SURVEYING the present standings it appears that a champion driver will be made at Ascot Speedway, Los Angeles, on Thanksgiving day. That the head that wears the crown lies uneasy will probably be vouched for by Dario Resta for it will be possible for Aitken to pull the laurels from the Italian on November 30 if the Indianapolis hero wins and Dario does not place.

Resta has not finished a race this year that he has not won so if one may be allowed to conjure a little, it is possible for Aitken to win at Ascot and if Resta does not win and follows his regular habits he will drop out. Ascot carries 700 points for the winner, 360 for second, 190 for third and 100 for fourth.

Although the Grand Prize carried 1,000 points for the winner, Aitken got none and Wilcox was given 416, his pro rata for driving twenty laps, the points per lap being 20.8. The present standing is:

Resta	4,100
Aitken	3,440
Rickenbacker	2,210
De Palma	1,790
D'Alene	1,120
Cooper	1,045
Milton	690
Henderson	667
Galvin	645
Mulford	620
Wilcox	591
Christlaens	540
Lewis	500
Vail	450
Devigne	350
Roads	280
Hughes	275
Patterson	270
Weightman	240
Buzane	210
O'Donnell	185

ing picture camera operator killing him, demolishing a refreshment stand, killing the women occupant and a spectator standing near. The car finished by wrapping itself around a third tree, cutting Jackson's body in two and hurled John Ghianda some 40 feet and badly injuring him. Wreckage from the car and refreshment stand broke the arm of a woman spectator and injured one man. Jackson has been driving a hard race but it was apparent that his car lacked speed on the straightaways and he took the turns at a reckless pace in an effort to make up for his lack of speed in other places. On the fourth lap, he missed the curve just beyond where he later met death, plunged over the curb into the street car tracks and broke a right rear wheel. It is believed this weakened his car and was partly responsible for the fatal accident nine laps later. This is the first fatality ever occurring during the progress of a race on the Santa Monica course.

Resta Out on Eighteenth Lap

On the sixteenth lap, Resta went into the pits and changed two spark plugs, came in again on the seventeenth, and in the eighteenth dropped to fifth position. At this time he was running on three cylinders and came in again, took down the motor and worked 2 hours changing the wiring and installing another magneto. He finally announced his withdrawal, giving motor trouble as the reason, and thus quit with his record of winning every race in which he finished this year unsullied.

With Resta in the pits, Wilcox again stopped in the twentieth lap when holding first position and asked to be relieved on account of sickness. Johnny Aitken took the wheel and Resta immediately registered a protest. Wilcox average up to the time he turned the car over to Aitken was 87.14 miles per hour. Anticipating that a victory in today's race would win the championship, Aitken drove at top speed,

ELIMINATIONS AND REASON THEREFOR

Car	Driver	Lap	Reasons
Peugeot	Aitken	1	Broken piston
Hercules	Agraz	2	Broken rod
Kissel	Anderson	5	Broken valve
Duesenberg	Moosle	6	Broken clutch
Owl Special	Carlton	6	Broken pump shaft
Mercer	Pullen	8	Burned up
Hudson	Vall	9	Burned bearing
Omar	Toft	10	Burned clutch
Gandy	Price	10	Broken clutch
Marmon	Jackson	13	Wreck
Durant Special	Durant	17	Broken valve
Cody Special	Cody	33	Motor trouble
Peugeot	Resta	18	Motor trouble
Duesenberg	Rickenbacker	26	Broken drive-shaft
Duesenberg	Buzane	27	Broken piston
Mercer	Ruckstell	39	Broken pressure line

his average at thirty laps being 86.6; forty laps 86.4, and forty-five laps, 86.08. In his forty-sixth lap he ran out of gas in the back stretch, but dumped a gallon from an emergency can into the tank which carried him into the pits. After getting the green flag, he took on more gas and finished the forty-eighth lap at an average speed of 84.59 miles per hour, a new record for the Grand Prize. After getting the checkered flag he blew a tire.

Richard Kennerdell, chairman of the contest board of the American Automobile Association, held that Aitken would be entitled to the championship points in proportion to the time he drove. Resta offered to buy Cooper's car to get back into the race but the proposition was not made. Cooper drove a very consistent race. Resta, Aitken, Wilcox, Pullen and Ruckstell in Mercers, and Rickenbacker in a Duesenberg, passed him but he never varied the pace of his Stutz and finished second with an average of 83.74 miles per hour, the same position which his Stutz won for him in the Vanderbilt last Thursday.

Third place went to A. H. Patterson in a Hudson Super-Six and with it a new non-stop record for 403 miles at an average of 78.13 miles per hour. This is the first race of any consequence that Patterson, who is a Hudson dealer at Stockton, Cal., has participated in, his inexperience being such that he went into the pits after getting the finish flag and was ordered to continue an additional lap in case of an error in the count. Roads, also driving a Hudson, finished fourth, which is the same place he held in the Vanderbilt race Thursday.



Resta winning the 1916 Vanderbilt and probably clinching the A. A. A. championship title

Eddie Rickenbacher called attention to the precedent set at Indianapolis this year when he was refused points after having taken Henderson's Maxwell as relief driver and finishing within the money. Kennerdell said tonight that Aitken probably will be credited the race victory, but not points in the championship. It is apparent that Aitken won, but just before leaving Los Angeles tonight, Kennerdell declared Wilcox name would show as the winner in the official records. Wilcox took second place in both the Vanderbilt and Grand Prize races at San Francisco in the winter of 1915.

Rickenbacker relieved Weightman, taking his Duesenberg in the thirtieth lap but failed to finish, although this was the only car running after the four winners had finished. Only three tire changes were made throughout the race although the pit stops numbered thirty-three.

Drivers rapidly fell by the wayside, the gruelling pace being too hot for them. Pullen's Mercer turned over and caught fire on the back stretch in the eighth lap and burned after Pullen and his mechanic had scrambled to safety. The crowd, which was estimated at 85,000, was orderly and well controlled.

How Resta Won the Vanderbilt

Averaged Nearly 87 Miles Per Hour

SANTA MONICA, Cal., Nov. 16—Driving his famous Peugeot faster than any car ever was sent over a road-race course in America, Dario Resta today won the eleventh Vanderbilt Cup race. It was the second consecutive time the Italio-Briton has won this race, his previous victory having been over a makeshift course within the exposition grounds at San Francisco, last year. Today he established an aver-

age of 86.9897 miles per hour for 294.0355 miles, or thirty-five laps of the 8.041-mile circuit, a new record for both the Vanderbilt race and the Santa Monica course over which Tetzlaff, in 1912, averaged 78.72 miles an hour for 302 miles.

Earl Cooper, in a Stutz, was second to finish. His average was 3 miles an hour less than Resta's. William Weightman III, the millionaire Virginian, driving a

CHRONOLOGY OF THE GRAND PRIZE ROAD RACE

FIRST RACE, SAVANNAH, GA., NOVEMBER 26, 1908

402.08 miles; circuit, 25.13 miles

	Time	M.P.H.
1—Flat, Wagner.....	6:10:31	65.08
2—Benz, Hemery.....	6:11:27	64.94
3—Flat, Nazarro.....	6:18:47	63.64

SECOND RACE, SAVANNAH, GA., NOVEMBER 12, 1910

415.2 miles; circuit, 17.3 miles

1—Benz, Bruce-Brown.....	6:03:05	70.55
2—Benz, Hemery.....	6:03:06	70.55
3—Marquette-Buick, Burman.....	6:11:23	66.67

THIRD RACE, SAVANNAH, GA., NOVEMBER 11, 1911

411.36 miles; circuit, 17.14 miles

1—Flat, Bruce-Brown.....	5:31:29.15	74.45
2—Benz, Hearne.....	5:33:33.07	74.00
3—Mercedes, De Palma.....	5:34:40.08	73.74

FOURTH RACE, MILWAUKEE, WIS., OCTOBER 5, 1912

409 miles, 4,616 feet; circuit, 7.882 miles

1—Flat, Bragg.....	5:59:27.44	69.30
2—Benz, Bergdoll.....	6:14:51.38	65.51
3—Stutz, Anderson.....	6:15:22.47	65.50

FIFTH RACE, SANTA MONICA, CAL., FEBRUARY 23, 1914

403.248 miles; circuit, 8.4 miles

	Time	M.P.H.
1—Mercer, Pullen.....	5:13:30	77.20
2—Marmon, Ball.....	5:53:23	68.40
3—Alco, Taylor.....	6:08:29	65.66

SIXTH RACE, SAN FRANCISCO, CAL., FEBRUARY 27, 1915

400.28 miles; circuit, 3.84 miles

	Time	M.P.H.
1—Peugeot, Resta.....	7:07:57	57.50
2—Stutz, Wilcox.....	7:14:36	55.25
3—Ono, Hughes.....	7:21:46	54.25

SEVENTH RACE, SANTA MONICA, CAL., NOVEMBER 18, 1916

403.24 miles; circuit, 8.401 miles

	Time	M.P.H.
1—Peugeot, Aitken-Wilcox.....	4:42:47	85.59
2—Stutz, Cooper.....	4:48:39	83.74
3—Hudson, Patterson.....	5:09:38	78.13
4—Hudson, Roads.....		.....
5—Duesenberg, Weightman.....	Flagged	

Duesenberg in his first professional contest, was third to see the checkered flag. Clyde Roads, Bakersfield, Cal., a rank outsider, in a Hudson Super-Six of his own, was fourth to get within the money. This was \$7,500 divided as follows: \$4,000 for first; \$2,000 for second; \$1,000 for third and \$500 for fourth position. Ira Vail and Patterson, also driving Hudsons, were the only other cars running at the finish out of a field of nineteen starters, which indicates how fast a pace was set.

By his victory today, Resta assumes a commanding lead in the American Automobile Association's championship award contest for the \$10,000 purse of the Goodrich company and the additional \$3,500 offered by the Bosch people. Resta now has an ad-

vantage of 700 points over Johnny Aitken for the championship.

Resta drove the sort of a race that deserved victory. Sixteenth to be sent away from the starting line, he was in third position at the end of the fifth lap, when the pace averaged 89 miles an hour. By the end of the tenth lap, the pace had slowed down to 87 miles an hour and he was in second position. He took the lead in the fourteenth lap and in the next, with the average the same as for ten laps, he was given the signal to slow down.

This had no effect on his driving. He seemed to be sure of his mount, and so, instead of reducing his speed, he increased it and had put the pace back to an average of almost 90 miles an hour by the

twentieth lap. Such driving never had been seen on a road course.

By this time he had passed every car on the road and seemed to have judged the speed of all of them so that he knew just how fast to go and play safe. In the twenty-fifth lap, his average was a little better than 88 miles an hour; in the thirtieth it had dropped to slightly under that figure.

The crowd was disappointed when a broken intake valve put Aitken out of the running in the twentieth lap. There was a groan from the packed stands when it was announced he was watching the progress of the race from a seat on the fence along the fastest stretch of the course. He

(Concluded on page 23)

CHRONOLOGY OF THE VANDERBILT CUP RACE

FIRST RACE, LONG ISLAND, N. Y., OCTOBER 8, 1904

284.4 miles; circuit, 28.44 miles

	Time	M.P.H.
1—Panhard, Heath.....	5:26:45	52.20
2—Clement-Bayard, Clement.....	5:28:13	51.60

SECOND RACE, LONG ISLAND, N. Y., OCTOBER 4, 1905

283 miles; circuit, 28.3 miles

	Time	M.P.H.
1—Darracq, Hemery.....	4:36:08	61.49
2—Panhard, Heath.....	4:39:40	60.72
3—Locomobile, Tracy.....	4:58:26	56.90

THIRD RACE, LONG ISLAND, N. Y., OCTOBER 6, 1906

297 miles; circuit, 29.7 miles

	Time	M.P.H.
1—Darracq, Wagner.....	4:50:10	61.43
2—Flat, Lancia.....	4:52:28	60.30
3—Lorraine-Dietrich, Duray.....	4:53:28	60.27

FOURTH RACE, LONG ISLAND, N. Y., OCTOBER 24, 1908

258.06 miles; circuit, 23.46 miles

	Time	M.P.H.
1—Locomobile, Robertson.....	4:00:48.2	64.38
2—Isotta, Lytle.....	4:02:38.4	63.88

FIFTH RACE, LONG ISLAND, N. Y., OCTOBER 30, 1909

278.08 miles; circuit, 12.64 miles

	Time	M.P.H.
1—Alco, Grant.....	4:25:42	62.77
2—Flat, Parker.....	4:30:58	61.55

SIXTH RACE, LONG ISLAND, N. Y., OCTOBER 1, 1910

278.08 miles; circuit, 12.64 miles

	Time	M.P.H.
1—Alco, Grant.....	4:15:58	65.18
2—Marmon, Dawson.....	4:16:23	65.08
3—National, Aitken.....	4:17:29	64.80

SEVENTH RACE, SAVANNAH, GA., NOVEMBER 27, 1911

291.38 miles; circuit, 17.14 miles

	Time	M.P.H.
1—Lozier, Mulford.....	3:56:00.67	74.07
2—Mercedes, De Palma.....	3:58:11.95	73.40
3—Mercedes, Wishart.....	4:06:20.37	71.00

EIGHTH RACE, MILWAUKEE, WIS., OCTOBER 2, 1912

299.54 miles; circuit, 7.882 miles

	Time	M.P.H.
1—Mercedes, De Palma.....	4:20:31.54	68.97
2—Mercer, Hughes.....	4:21:14.24	68.79
3—Mercedes, Wishart.....	4:36:35.75	65.00

NINTH RACE, SANTA MONICA, CAL., FEBRUARY 26, 1914

403.24 miles; circuit, 8.4 miles

	Time	M.P.H.
1—Mercedes, De Palma.....	3:53:41	75.49
2—Mercer, Oldfield.....	3:55:01	75.06
3—Mason, Carlson.....	4:02:39	72.70

TENTH RACE, SAN FRANCISCO, CAL., MARCH 6, 1915

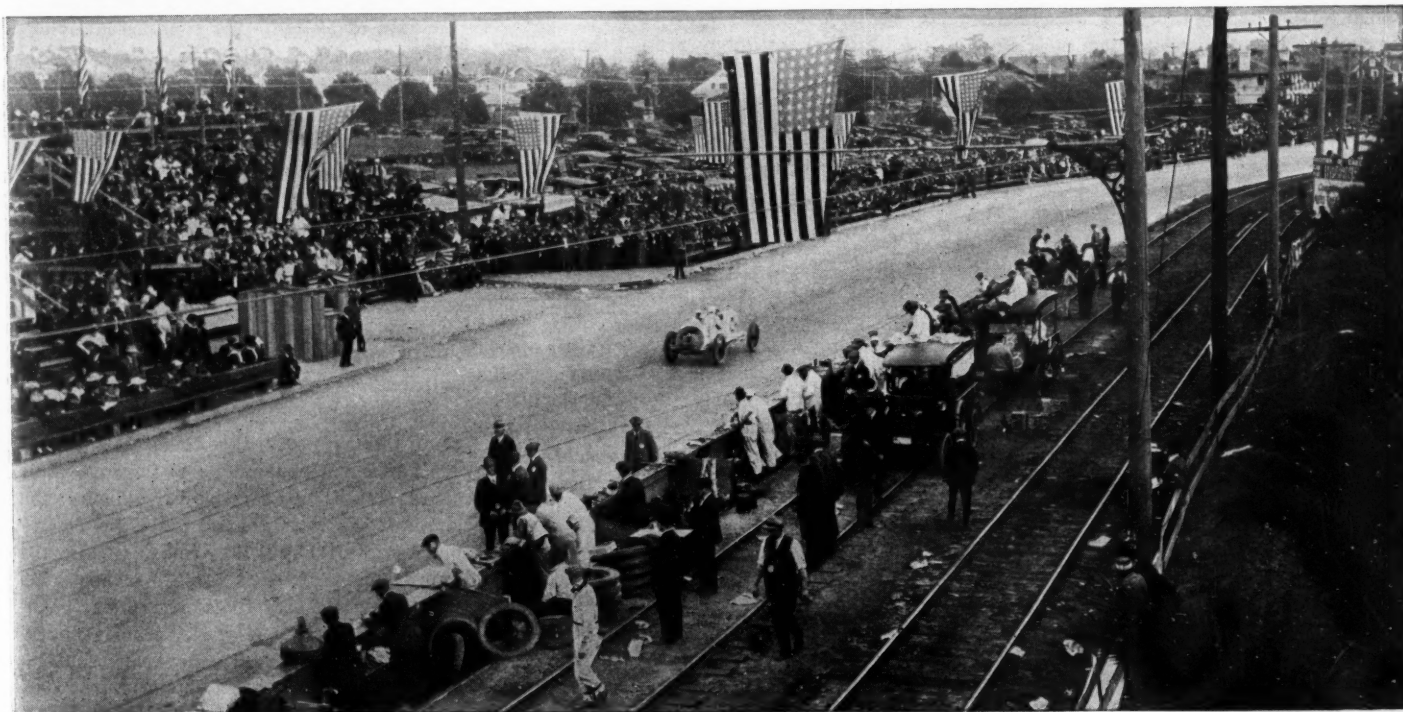
300.3 miles; circuit, 3.84 miles

	Time	M.P.H.
1—Peugeot, Resta.....	4:27:37	67.20
2—Stutz, Wilcox.....	4:34:36	65.60
3—Mercer, Pullen.....	4:35:37	65.30

ELEVENTH RACE, SANTA MONICA, CAL., NOVEMBER 16, 1916

294.03 miles; circuit, 8.401 miles

	Time	M.P.H.
1—Peugeot, Resta.....	3:22:48.4	86.90
2—Stutz, Cooper.....	3:30:40.4	83.71
3—Duesenberg, Weightman.....	3:42:00.4	79.47



The stretch from behind the pits with Cooper passing

Trial Reveals World-Wide Ford Plans

Preparations Made to Flood World Nations with Cars—Concern Spends \$800,000 Daily

DETROIT, Mich., Nov. 10 — The Ford Motor Co. plans to conquer motor car markets in every corner of the earth, and has investigators now seeking complete information in Russia, South America, France, England, other European countries and the various English colonies. The company employs 50,000 men, is under a daily expense of \$800,000, and is 150,000 cars in arrears. Ford stockholders have received \$4,000,000 in dividends since July 31, when the fiscal year ended, and another large cash dividend is being contemplated for January 1, 1917. On November 9, stockholders were voted a 100 per cent dividend on the \$2,000,000 capital stock. The company purchased material between July 31 and November 11, amounting to \$7,304,345.89, and had a bank balance in cash of \$37,938,526.21 in various banks on November 13, 1916. These and many other sums and plans of appalling magnitude were revealed at the hearing of the suit instituted by the Dodge brothers against the Ford Motor Co. to restrain Mr. Ford from spending undivided profits in factory expansion.

Some Pertinent Points

Other points determined by the hearing show Mr. Ford's salary to be \$150,000 and that of C. H. Wills, factory manager, at \$80,000 yearly. The hearing displayed how Mr. Ford plans to distribute 700,000 cars in 1917, how he had already planned for meeting the scheme of the allied countries to unite after the war to buy only the products of favored nations, and how he was hampered by some of the men in his own company, the Dodge brothers, because, he testified, he had refused to buy their Ford stock for \$35,000,000.

Mr. Ford said that in addition to the Manchester plant in England with a capacity for assembling 18,000 cars yearly and the Canadian Ford plant with a capacity of 30,000 to 35,000 cars per year, the company will erect a plant in Southampton, England, with a capacity for the complete manufacture of 40,000 cars yearly. This, he said, is done to meet the plan of the allied nations to get together after the war and buy only in those countries favored by the allies.

Mr. Ford testified that James Couzens told him the Dodges were making \$1,000,000 a month and that John F. Dodge had given this information to Mr. Couzens. He defended his policy of price reduction and said the last reduction of the touring car price to \$360 was made to insure a 500,000 production and that this mark was reached with a profit of about \$6,000,000 to the company.

He admitted plans for the erection of blast furnaces at a cost of \$11,000,000 and

declared that he had samples of the iron made by the old cupola method and by the new method to be used in his plan and that the difference was so great that its advantages could be easily observed by an inexperienced person. He estimated the saving effected by the new method to be between \$10 and \$15 per car and thought it would take about 1 year to make up the expenditure of \$11,000,000 that the new blast furnaces would necessitate.

F. L. Klingensmith, vice-president of the Ford Motor Co., testified that the dividends for the year ended July 31, 1915, were \$13,000,000, special in addition to the regular 60 per cent dividend of \$1,200,000. The next year the special was \$5,000,000 in addition to the regular \$1,200,000, or 60 per cent dividend. "What was your cash balance July 31, 1916?" he was asked. "Approximately \$52,000,000."

"Some went into bonds, some into ordinary expenditures, and you must remember the period includes the time when the scale of reduced prices for the car went into effect."

At this point, the attorney for the Ford company sought to amplify the testimony and said, "But the reduced prices have stimulated business, have they not?"

"Yes, sir."

"Are you keeping up with your sales?"

"No, sir, we are 150,000 cars behind on immediate deliveries."

Further questioning showed that the company maintains a balance in 300 banks throughout the country.

Additional testimony proved that selling agents for Ford cars receive 15 per cent commission and an addition of 1½ to 3 per cent as bonuses for great volume of business.

PACKARD PRICES BOOSTED

Detroit, Mich., Special telegram—Packard will increase the price on its model 225, the smaller twin six, \$185, and on longer wheelbase model, \$235, the new prices being \$3,050 and \$3,500 on all open cars. The new prices will apply to all orders for delivery after February 1, 1917, and to be delivered before that date after 4,500 cars of new models are sold. Increased cost of manufacture is the cause of the raise.

OVERLAND ANNOUNCES SPORT MODEL

Detroit, Mich., Special telegram—The Willys-Overland Co. is making deliveries of a new sport model called the Country Club, four-passenger roadster. It uses the same chassis as the present model 75B and has sloping windshield and black fenders.

The two front chairs are convertible and move independently forward and back to length suitable to the driver and companion. Front-hinged wide U-doors with pockets for tools are used and there are special springs for the cushions. Wheelbase is 104 inches and the motor is a four-cylinder block-cast type with a 3¼-inch bore and a 5-inch stroke. Ignition is by battery and distributor. A Tillotson carburetor is used and fuel is taken from a 12½-gallon gasoline tank under rear dash through a vacuum-feed system.

LOS ANGELES SHOW SUCCESS

Los Angeles, Cal., Nov. 18—Business totaling \$500,000 will result from the recent car and truck show held here, according to the estimates of the dealers who participated. This is based on the fact that two-thirds of the cars put on display were sold as the direct result of the show and orders taken for subsequent delivery which will swell the total to the figure stated. Never before did a Pacific coast exhibition prove so successful from every standpoint.

The satisfactory results probably mean that there never will be another professionally-promoted show held here. For years, the professional promoter held sway. He would manage to secure the signature of two or three dealers to a contract to take space and with this as a nucleus, induced or coerced others to follow suit. The recent show was held under the auspices of the Motor Car Dealers' Association and not only was the volume of business greater than ever before, but the association itself profited to the extent that its membership now is four times as large as when the show was proposed.

The show cost the association between \$15,000 and \$18,000. Practically all of this was covered by the sale of floor space at the rate of 30 cents per square foot. There were more than 40,000 paid admissions at 25 cents apiece.

SHARING ROAD MAINTENANCE

Washington, D. C., Nov. 18—A conspicuous example of what happens to county roads when a city, the center of heavy motor car traffic, fails to contribute toward the building and maintenance of country roads, is found in Spotsylvania county, Va., according to specialists in road economics of the United States Department of Agriculture.

The country districts of Spotsylvania county some years ago issued \$170,000 of 4½ and 5 per cent bonds to improve their county roads. Under the Virginia law the cities of the state are not taxed for county purposes, although they may aid in the improvement of roads for a distance of 10 miles from the city limits if the city council so elects. The city of Fredericksburg, in Spotsylvania county, however, contributed no part to the financial burden of maintaining the county roads. The heavy motor car traffic emanating from that point

has proved to be a very destructive element to the county road system, and it was found that rapid deterioration was taking place in the county roads, and insufficient funds existed with which to meet the situation. The county authorities, accordingly, established toll gates on the principal roads and sufficient revenue thus was derived, not only to maintain the roads, but actually to extend their construction a short distance. This reversion to a system long since abolished by most counties was partially due at least to the fact that the city in this county had contributed nothing to the upkeep of the roads which residents of that city use extensively for motoring.

The writers of the report suggest, in view of the very rapid development of motoring vehicles in the last decade and the prospects of much more widespread use of this means of transportation in the future, the desirability of making provisions so that the cities may aid in the construction and maintenance of roads in the surrounding territory.

STICKERS FOR TRAFFIC VIOLATORS

Salem, Mass., Nov. 18—City Marshall Haughton, of the Salem police department, has evolved a novel method of getting after violators of traffic regulations who let their cars stay too long on the streets. He has furnished his policemen with stickers, and when they find a car breaking the law and the owner is not in it a sticker is placed on the windshield requesting the person to appear at police headquarters and explain why he did it.

One of the first owners who found a sticker on his car was Judge Sears, who passes on motor cases. His car was outside the court house unattended when Marshal Haughton came along. The eagle eye of the chief saw it and he placed a sticker on it before he realized that the judge would be summoned to appear in court before himself, if that were possible.

AKRON TO HAVE SHOW

Akron, O., Nov. 18—For the first time in the city's history it will have an exhibition for passenger cars, exclusively, this year, December 9 to 16, inclusive. The show will be given by the newly-formed Akron Automobile Dealers' Show Association, of which the following are officers: President, A. O. Wood; vice-president, E. G. Grady; secretary, W. J. Boardman; treasurer, J. H. Wiener; and executive board, Andrew Auble, Jr., C. C. Lowe, F. C. Sibbald. Grover Reese, secretary of the Akron Automobile Club, was made general manager of the 1916 show.

Nearly forty lines of cars, the value of which will be close to \$200,000 will be exhibited at the East Market Street Gardens. All the space in the show was sold in 35 minutes.

Akron now has more cars per capita than any other city of its size in the country.

Angeles Car Thefts Over \$1,000,000

Philadelphia and Boston Taking Steps to Prevent Machines Being Stolen

LOS ANGELES, Cal., Nov. 18—Motor car thefts in the city of Los Angeles for this year have exceeded the \$1,000,000 mark, according to a report issued by the theft bureau of the Automobile Club of Southern California. As against the same period of last year the thefts have increased in number by 216 cars. There were 1,051 cars stolen during the first 9 months of 1916 as against 835 for the same period a year ago.

The large increase is attributed to the constantly growing number of cars in Los Angeles and the fact the number of thieves seems to gain proportionately. Carelessness of motorists in failing to lock their cars properly or guarding them in any way is assigned as the cause for the successful operation of thieves. During October there were 108 cars stolen and of this number twenty-nine were recovered by the club's theft bureau. The police have been active also, but there remain thirty-eight cars unaccounted for.

PHILLY THEFTS RUN HIGH

Philadelphia, Pa., Nov. 18—The Automobile Club of Philadelphia has arranged with a detective agency in this city for the recovery of cars that have been stolen from the members, and the apprehension and punishment of the guilty ones. The recently organized motor car division of the detective bureau of this city has not been effectual in this direction as the number of stolen cars is increasing weekly.

BOSTON PLANS THEFT REDUCTION

Boston, Mass., Nov. 18—So many motor cars are being stolen in Boston that the Bay State A. A. has taken a hand in the matter and its officials are planning to do something to lessen the number of thefts. At a meeting of the Board of Directors this week, a committee was appointed headed by President George W. McNear, that is to confer with Superintendent Crowley of the police department, and officials of the insurance companies with a view of getting some definite plan to recover cars, and prosecute offenders.

Arthur P. Teele, one of the directors of the Bay State A. A., is an attorney and he will appear in court to represent the organization when culprits are brought to justice. The club will have a bill presented to the legislature to make stealing of motor cars a more drastic offense. Some years ago the Massachusetts State A. A. presented a bill to the legislature, but it was so worded that it did not leave much discretion to the judges, and for a slight offense it provided for a state's prison sen-

tence. As some of the motorists opposed it the bill had no chance.

G. O. Waddell, head of the dealer help department of the Goodyear Tire Co., told the directors how the Cleveland Automobile Club checked motor stealing in that city.

LINCOLN HIGHWAY DIRECTORS MEET

Detroit, Mich., Nov. 20—The recent annual meeting of the directors of the Lincoln Highway Association brought together some of the most prominent men in the motor car industry and others whose names are familiar to the public generally. Deep personal interest on the part of each in the present development and future importance of the Lincoln highway to the country was responsible for the attendance of all but two of the board.

DIMMERS TESTED AT COLUMBUS

Columbus, O., Nov. 20—Diffusing lenses, reflectors, deflectors and improvised or home-made dimmers went through their paces before a commission representing the Columbus Automobile Club, city officials and car dealers last week.

In a short time, the commission will report on the various devices that meet the approval of the police department through compliance with the new traffic code, which became effective recently.

In addition to Prismolite lenses, previously approved by city officials, the following lighting devices were tested: Warner lens, Opalite bulb, Deflex, Conophore lens, Rand Reflector, Legalite, Osgood and Haskins & Slonaker Human Eye. Devices also were shown by the N. C. S. Reflector Co., Harry Rowe, Rogers Supply and Tire Co., and Peters & Herron Dash Co.

EMPIRE PRICES INCREASE

Indianapolis, Ind., Nov. 20—Within the next few weeks the Empire Automobile Co. will increase the price on all Empire models, although the definite amount has not been agreed upon. The present prices will hold until December 20, and it is said that these prices will be an actual saving of from \$70 to \$100 to Empire buyers who purchase before that time.

MARMON PRICE TO RAISE

Indianapolis, Ind., Nov. 18 — The Nordyke & Marmon Co. announces an increase in the price of the Marmon 34 to become effective January 1, 1917. The company as yet has not announced the exact amount of the increase, but declares it will be only enough to cover the increased cost of materials. The advance will apply to the chassis and to all body styles.

Motordom's Highlights of the Week

Firestone Gives Employees Insurance Fund— Saxon Plant Visited by Fire

AKRON, O., Nov. 20—In keeping with the welfare work of its employees, the Firestone Tire and Rubber Co. has voted to give \$1,000,000 for an employees' welfare and insurance fund. The call for a meeting which was held early this month proposed an increase of the capital stock of \$50,000,000, and a stock dividend of 700 to 800 per cent be declared, but instead the stockholders voted to set aside the \$1,000,000 insurance fund, to fix the authorized capitalization at \$15,000,000, to reduce the nominal value of shares from \$100 to \$10, to sell \$500,000 worth of common stock to employees and officers, and to enlarge the board of directors from five to seven.

ANOTHER FAKER WORKING

Chicago, Nov. 20 — Information has reached the Jefferson Electric Mfg. Co., this city, from dealers and garage owners to the effect that they have been approached by a man styling himself, "Speers the Distributor," and alleging to be connected with that company, who has charged them enormous prices for a Ford magneto lamp regulator put out by this company. The Jefferson company declares that it has no such person in its employ.

WESTWOOD LEAVES INDUSTRY

Detroit, Mich., Nov. 20—W. G. Westwood has joined the selling organization of the Hannan Real Estate Exchange. Mr. Westwood was formerly vice-president and general manager for the Tire and Auto Service Co. and is president of the Detroit Automobile Trade Association.

A CORRECTION

In the Motor Age issue of November 2, page 77, in the short description of the 1-ton attachment for the Ford chassis, built by the Jewett Car Co., Newark, O., the wheelbase was incorrectly given as 102 inches, and should have been given 118 inches. The price is \$350 instead of \$375, as stated.

GROSSMAN CHANGES NAME

New York, Nov. 20—The Emil Grossman Mfg. Co., Inc., has been reorganized and henceforth will be known as the Emil Grossman Mfg. Corp. The capital stock is divided \$150,000 first preferred, \$160,000 second preferred, and 10,000 shares of common stock of no par value. The entire capital has been paid in and the new officers of the company are: Emil Grossman, president and general manager; L. M. Schwartz, vice-president; Harmon

August, treasurer, and C. L. Hemphill, assistant secretary and treasurer. Reorganization is a part of the company's plan to enlarge its business.

TURNBULL TO MAKE BODIES

Defiance, O., Nov. 20 — The Turnbull Wagon Co., has created a new department and in the future will devote a portion of its plant to the manufacture of motor car bodies. Considerable machinery has been installed and the first allotment of bodies will number 10,000. About 100 men are employed in this new department.

NO CHANGES IN WINTON

Cleveland, O., Nov. 20—No changes will be made in the Winton line for 1917, this company having decided to discard the practice of bringing out so-called new models each year where the main point of difference consists chiefly in mere changes of size, or of alterations made to affect selling prices. The model 33 will sell at \$2,485 and the model 48 at \$3,500.

RETURN FROM MEXICAN BORDER

Detroit, Mich., Nov. 20—Roy D. Chapin, president of the Hudson Motor Car Co., and Howard E. Coffin, vice-president, have returned to Detroit from the Mexican border, where they made a study of motor car conditions and of the use of the motor truck and the aeroplane.

TRUCK WHEEL CORP. FORMED

Chicago, Nov. 21—The American Truck and Wheel Corp. of Chicago, which is capitalized at \$1,000,000, has filed charter in Delaware to manufacture motor truck wheels, etc. The incorporators are William C. Loftus, John R. Cavanaugh and Ross J. Cavanaugh.

EMPIRE TO HAVE SEDAN

Indianapolis, Ind., Nov. 18—The Empire Automobile Co. has entered the field of inclosed cars, having announced a sedan type which will be ready for delivery about December 1. It will be of a convertible inclosed type. The price for the model has not been announced. The car will have but two doors, one on each side about midway of the body. These doors give admission direct to the rear compartment, the front seats being reached by an aisleway. The upholstery will be of gray and black Bedford cord. Four interior lights are afforded with dome lights in center of the top and at either side of the rear window, in addition to the dash lamp. Two

cellarettes or small package compartments are provided behind the rear seat cushion. The sedan body is mounted on the six-cylinder chassis with 120-inch wheelbase. The company announces that the price will be considerably lower than any car of equal size in this type on the market.

HUPP CAR AT DENVER

Detroit, Mich., Nov. 20—The Hupp capital-to-capital party left Cheyenne November 18 and reached Denver the evening of the same day, bringing the total mileage covered to 11,526 miles and raising the number of capitals visited to thirty-three. The party will rest at Denver after its strenuous drive through the snow-covered passes out of Cheyenne and will leave Denver November 21 for Santa Fe.

AIDS FREIGHT CONGESTION

Detroit, Mich., Nov. 20—The transportation committee of the Detroit board of commerce has originated a campaign resulting in the unloading of more than 17,000 freight cars, greatly alleviating the congested conditions of Detroit freight yards.

STEENSTRUP WITH EXPORT COMPANY

Detroit, Mich., Nov. 17—Peter S. Steenstrup has joined the General Motors Export Co., succeeding O. G. Bennett, who has resigned to embark in a new venture for himself. Mr. Steenstrup was formerly the general foreign representative for the Hupp Motor Car Co. and spent the past 3 years abroad studying conditions in South America and in Europe.

WOODARD GILLETTE TIRE PRESIDENT

Eau Claire, Wis., Nov. 20—S. P. Woodard has resigned as general manager of the New Jersey Car Spring and Rubber Co. to become president of the Gillette Safety Tire Co., this city. This is a new tire company incorporated under the laws of the state of Maine for \$1,000,000. Mr. Woodard's office as president will be located in New York.

TRAVELING TIRE REPAIR SHOP

The motor car now is hailed as the latest cure for lung troubles. No longer is it necessary for the sufferer to betake himself out on the desert in search of relief from the dreaded white plague. All that is necessary is a motor car, according to one man, to overcome this ill.

Alfred Gill is a former Los Angeles bank clerk who had to get out in the open

for his health. His lungs were affected.

The young bank clerk had a very small bank roll so he was not able to invest in any business; but he hit upon the idea of a traveling garage. With the small amount of capital he had, he purchased a Chevrolet Four-ninety touring car on time payment plan. He then had a small truck body built to replace the touring body. This he stocked up with tires, oil, tools and a small line of accessories and started out to get the business on the highway.

At first business was slow. It looked as if the venture was bound to fail; but little by little the young man with his traveling garage worked up a business and today he has his health and is making more money than the highest paid clerk in the bank.

On the traveling garage Gill carries a large tank of gasoline. He carries three grades of oil, an assortment of tires and tubes, tools for repair work and a small supply of parts.

The business has paid so well during the past summer and fall months that Gill is extending his operations and is planning on putting on two more "public service" cars. One of these little Chevrolet garage trucks is to cover the Imperial Valley and the other is to work the highway north of Los Angeles, another, San Diego.

VELIE MAKERS CONSOLIDATE

Moline, Ill., Nov. 20—Consolidation of the Velie Motor Vehicle Co., maker of the Velie Biltwel six and the Velie Engineering Co., builder of Velie trucks was accomplished at a meeting November 14 under the corporate title, Velie Motors Corp. Capital stock of the new corporation is being increased to \$2,000,000 which is accomplished without the introduction of new capital. It is felt that the merger

was expedient at this time since it would offer a consolidation of buying power that would in measure offset the present high cost of material. The merger does not affect the Velie Carriage Co., which will continue to operate as a separate institution making horse-drawn vehicles. The personnel of the directorate remains unchanged as follows: W. L. Velie, S. H. Velie, F. R. Todd, C. V. Rose, F. E. Bradfield, O. E. Mansur and L. E. Nutt.

BANQUET COMMITTEE NAMED

Detroit, Mich., Nov. 20—Thomas J. Wetzel of the Wetzel-Hall Co., Detroit and New York; Christian Girl of the Perfection Spring Co., Cleveland; James H. Foster of the Hydraulic Pressed Steel Co., Cleveland; C. W. Stiger, president of the Stromberg Motor Devices Co., Chicago; C. E. Thompson of the Steel Products Co., Cleveland; L. M. Bradley, manager of the Motor and Accessory Manufacturers; and W. M. Sweet, chairman, comprise the committee in charge of the annual banquet of the Motor and Accessory Manufacturers, to be held January 10 in New York, during show week.

LYNGASS JOINS SALES CORP.

Detroit, Mich., Nov. 20—C. F. Lyngass has been appointed export agent to handle foreign shipments on the Day-Ray line for the Manufacturers' Sales Corp.

RIVALRY FOR GOOD ROADS

Los Angeles, Cal., Nov. 18—Competition over the route for improved roads is being tried in this state. The rivalry is between the northern and southern sections of the state. The Tehachapi range of mountains provides the dividing line. For more than a year, the southern half of the state has been making a play for eastern

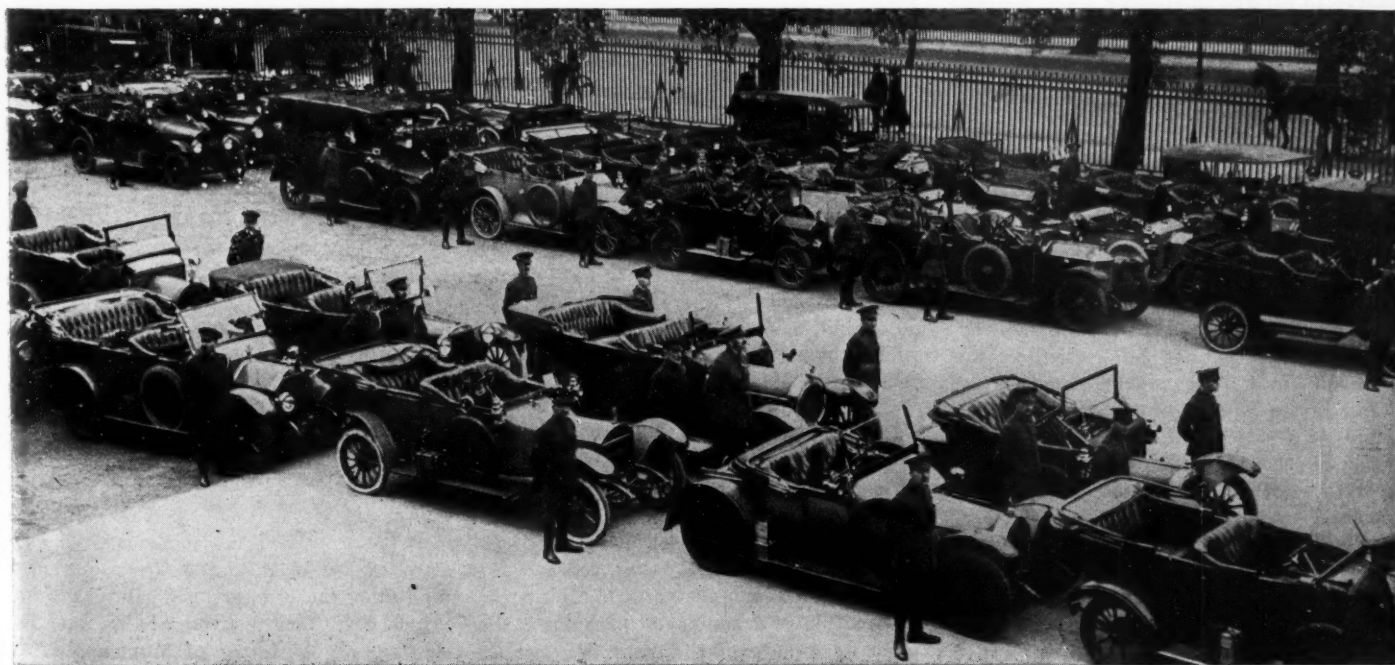
tourists by urging road improvements and sign-posting roads leading direct to Los Angeles. The Lincoln highway was tapped in Nevada by a feeder road and more than half of the traffic has been brought here as the result instead of continuing direct over a miserable road to San Francisco. It now is proposed to go still further east and improve the old Mormon Trail from Salt Lake City here. San Francisco and the northern half of the state have become alarmed and a campaign now is being waged for subscriptions to build better roads east into Nevada, across the Fallon sinks and direct to the Golden Gate. This money will be in addition to that spent by the state highway commission, which will have no jurisdiction over it.

CORNELIUS WITH PARKER CO.

Detroit, Mich., Nov. 20—W. M. Cornelius has been appointed assistant to the president of the Parker Rust-Proof Co. Mr. Cornelius was formerly the secretary of the security commission at Lansing.

FORM-A-TRUCK CO. TAKEN OVER

Chicago, Nov. 20—The Smith-Form-A-Truck Co., which has been making units for converting the Ford into a truck, has been taken over by the Smith Motor Truck Corp. This practically amounts to a reorganization although the official personnel changes but little. E. I. Rosenfeld, who in reality is the founder of the business, is president of the new company, which is capitalized at \$12,000,000, \$10,000,000 being common stock and \$2,000,000 being preferred. The underwriting will be handled by Michaelis & Co., and the preferred stock will be redeemable at 120. Ground will be broken for an addition to the present plant within 10 days, this addition practically doubling the capacity of the present plant.



Inspection of British national motor volunteers by Major-General Sir Francis Lloyd at Wellington Barracks

Denver's New Ordinance Like Eno's

Uses Motor Age Rules as a Basis in Compiling Revised Regulations

DENVER, Colo., Nov. 17—A new traffic ordinance, patterned closely after the Eno system of traffic regulation recommended recently by Motor Age, has just been passed by the Denver city council. It will take effect January 1. Where the Denver ordinance departs from the Eno plan, the exceptions are due to local conditions. The basic provisions are practically the same, and Manager of Safety Bailey, Chief of Police Armstrong and Traffic Sergeant Thompson, who worked out the main features of the new ordinance, are strongly in favor of the Motor Age idea of getting a uniform traffic law adopted by all cities of 5,000 or over.

The principal gains which the new law affords toward greater safety to all using the streets are the provisions to eliminate glare from headlights and still give a good driving light by tilting the lamps downward in a manner shown to be practical by extensive experiments carried out by traffic officers; to require street cars to make the near side stop; to emphasize that any form of reckless driving is a violation of law, while at the same time permitting an increase of speed limit to 15 miles an hour in the congested district and 25 miles an hour outside; to require one-way traffic in alleys in the congested district; to prohibit vehicles from standing more than 1 hour on any street in the district specified as congested, and to restrict parking of vehicles in other ways more rigidly than heretofore; to increase the authority of the manager of safety to enforce emergency measures, and to insure the complete authority of the traffic officers to control all traffic at intersections where they are stationed; to require pedestrians to cross the street within the sidewalk lines extended, and to penalize jay-walking.

Definition of Right-of-Way

The right of way is specified as belonging to the vehicles approaching an intersection from the right, except where a traffic officer is stationed in control, where semaphore regulation must be obeyed. Street cars must not be passed on the left side, and must not be passed when standing to receive or discharge passengers. If a street car stops for any other purpose, the conductor or motorman must so inform other traffic. These two provisions concerning right of way at intersections and the right and wrong way to pass street cars are practically the same as covered by the present ordinance, but all the other provisions outlined in the above summary of safety gains are either entirely new or greatly improved.

Special rules for safety zones, center parking on certain streets and other restrictions will likely be worked out soon after the new law goes into effect.

It is also likely that standard accident blanks will be adopted for the use of traffic officers and other police officers in reporting accidents. The ordinance itself requires that any person involved in a collision or other accident must stop his vehicle and render injured persons any assistance possible, and also furnish his name and address to the injured person, or any other person requesting the same. The order recommended by Motor Age to make it clear to all policemen that they have general traffic obligations is indorsed by Traffic Sergeant Thompson, who expects to see some such order issued to all members of the Denver police force.

BOARD TO STUDY PARKING

Minneapolis, Minn., Nov. 20—To keep in touch with the parking situation in Minneapolis a permanent board has been formed of representatives of the Civic & Commerce Association, Automobile Club, Retailers' Association, Draymen's Association, Real Estate board, taxicab companies, police and fire departments. A sub-committee is preparing an ordinance following strict enforcement of the present ordinance involving about 35 arrests a day. Locked car wheels will be prohibited. Grass boulevards on several downtown streets will be removed outside the 30-minute parking area to make room for parking of cars there.

CAUTIONS CHICAGO MOTORISTS

Chicago, Nov. 20—Actuated by the recent accident at the Halsted street bridge, comment on which was made by Motor Age in a recent issue, Commissioner of Public Works Morehouse has appealed to motor car drivers to pay better attention to signals at bridge crossings. He declares the average motorists will obey the whistle of a traffic officer where there is little or no danger, but will disregard bridge signals where there is imminent danger.

AMERICAN SPEEDWAYS ASS'N FORMED

Chicago, Nov. 18—Speedway managers this week formed an association in the form of a national organization to standardize racing conditions and draft uniform regulations and co-operate in getting drivers to compete in all events. The meeting held at the Chicago Automobile Club is the culmination of a number of previous futile attempts to organize during the last 18 months. At this meeting a constitution

was adopted and officers elected as follows: President, Harry Harkness, New York speedway; vice-president, James A. Allison, Indianapolis speedway; treasurer, Harry S. Lehman, Cincinnati speedway; secretary, T. E. Meyers, Indianapolis. The following speedways had personal representatives present: Indianapolis, Uniontown, New York, Providence, Des Moines, and Chicago, while Cincinnati and Omaha sent proxies to David S. Reid of the Chicago speedway.

In the newly formed organization, which is to be known as the American Speedways Association, there are two classes of membership, Class A, open to speedways having a course of 2 miles in length or over and Class B, open to speedways having a course of less than 2 miles. In each case only those speedways will be admitted whose construction is approved by the membership committee of the association. Chief control will be in hands of governing board consisting of three representatives of Class B and four representatives of Class A. The governing board consists of: Allison, Indianapolis; Harkness, New York; Reid, Chicago and Lehman, Cincinnati as Class A members and C. W. Johnson, Uniontown; Fred H. Perkins, Providence; and Samuel Orloff, Des Moines, of Class B. The governing board and officers were elected to serve until next meeting in New York, January 12. The American Speedways Association supersedes the Speedways Association of America, which it was intended to organize earlier in the year and which was incorporated under special charter from the Indianapolis legislature, but which all except Indianapolis refused to join. Meyers, of Indianapolis, made a strong plea to have the association formed under the existing charter as the Speedway Association of America, but was out-voted.

CLUB HIRES TRAFFIC COPS

Delaware, O., Nov. 20—The town of Delaware was too poor to hire traffic policemen to protect the lives of its citizens, so the Delaware Automobile Club hired two men, at its own expense, to do duty at the principal corners in the city. Moreover, these special traffic officers are to be attired entirely in white.

ANOTHER FORD TRACTOR CO.

Detroit, Mich., Nov. 17—The Ford Tractor Co. has been incorporated under the laws of Delaware to manufacture tractors and other machinery. The capital stock is \$1,000,000. Incorporators are W. Baer Ewing and C. M. Hertig, of Minneapolis, and F. D. Buck, of Wilmington, Del.

Headlight Glare—What It Is

Expert Defines Dazzling Rays and Their Effect on Car Drivers and Others

DETROIT, Mich., Nov. 16—When a motor car headlight is so powerful as to be dangerous in its blinding effect it is a glare. Glare cannot be regulated either by a bulb or a reflector but must be determined by reaching a certain unit standard of light beyond which is considered glare, this unit to be discovered by the effect on the vision of an approaching driver. These were the principal details on the subject of glare discussed by J. B. Replogle, director of research at the Remy Electric Co., before members of the Detroit section of the Society of Automobile Engineers, last night.

In his address Mr. Replogle confined himself entirely to the question of what constitutes glare and how it can be measured, thus precluding any discussion as to the merits of the various methods of eliminating glare. He told of his investigation of the ordinances of the different cities and states and read a number of them showing how futile and in many instances ridiculous all attempts have been in the effort to define or regulate glare.

Ordinances Not Intelligent

"When I got through with this mass of correspondence," said Mr. Replogle, "I found myself in about as puzzled a condition as I was at the beginning. The only reference made to a unit was where the candlepower of the bulb was specified. Inasmuch as it is a matter of common knowledge that the effect produced by a lamp of a definite candlepower varies many hundred per cent according to the way it is reflected or condensed, the candlepower unit is a meaningless one.

"The glaring effect of a headlight is to a very great extent a function of its environment. For instance, in broad daylight the brightest headlight does not cause

inconvenience, while on a very dark night on a country road, a headlight which is ordinarily considered to be well dimmed, often produces extreme discomfort and constitutes a real menace. Suppose you are looking in subdued light at an object which is sufficiently illuminated to be plainly visible. The pupil is dilated so that the eye can receive as much light as possible from the object to be viewed. If now a bright light is thrown in your eye, the pupil contracts so that while the same amount of light is coming from the viewed object as before, but a small portion of it can reach the retina of the eye and produce vision. This reduction of vision the ophthalmologist calls 'depression in vision function.'

"A qualitative definition of glare is that

WHAT REPLOGLE SAYS ABOUT GLARING HEADLIGHTS

Glare is a depression in visual function due to contrast between the direct illumination of the eye from a source of illumination of an object it is desired to view.

* * *

When a motor car headlight is so powerful as to be dangerous in its blinding effect, it is a glare.

* * *

Glare cannot be regulated either by a bulb or a reflector, but must be determined by reaching a certain unit standard of light beyond which is considered glare, this unit to be discovered by the effect on an approaching driver.

* * *

The glaring effect of a headlight is to a very great extent a function of its environment.

it is depression in visual function due to contrast between the direct illumination of the eye from a source of illumination and the illumination of an object it is desired to view. This glare is prohibitive when the object of vision is difficult to discern. Accepting this as a working hypothesis, we next approach the question as to a unit of glare and how to measure it.

"In technical photometry, a course of illumination is known by four characteristics.

"1—Its luminous intensity or the rate at which it is emitting light in a given direction: its unit is the candlepower.

"2—Luminous flux or the total amount of light emitted in unit time: its unit is the mean of the spherical candlepower.

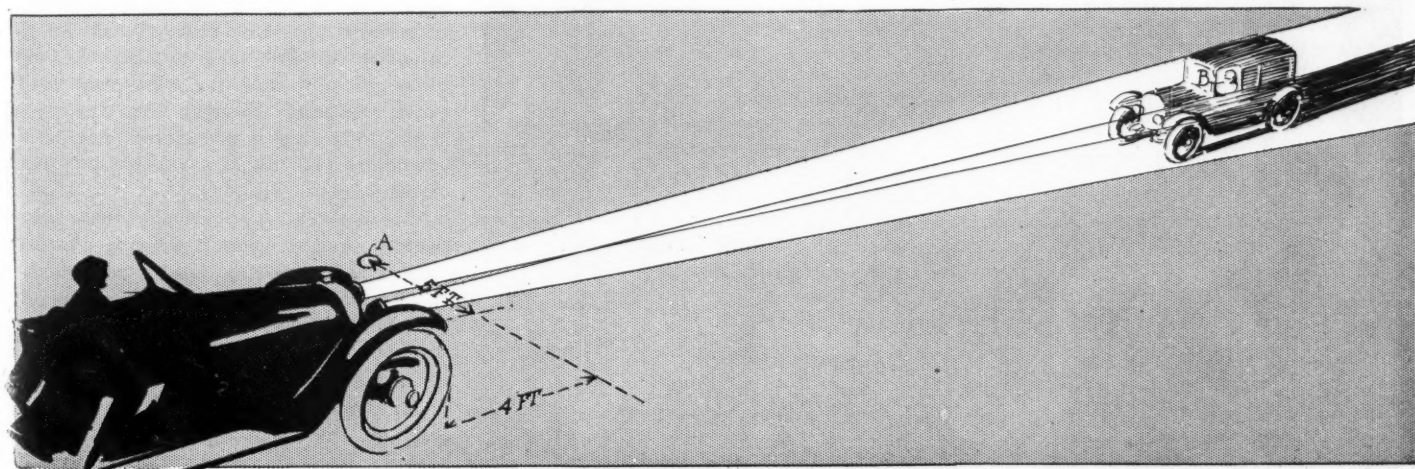
"3—Illumination or the illuminating effect produced at a given distance: the unit is expressed in candle feet or foot candles.

"4—Intrinsic brilliancy which is expressed in mean spherical candlepower produced by the source in question and an arbitrarily selected standard.

Disseminating the Characteristics

"Let us see if the unit of headlight glare cannot be successfully adapted from the standpoint of the unit of illumination, or the foot candle. It is wise to establish our units so as to apply to the most perilous situations with the feeling that the other situations will be thereby satisfactorily taken care of."

Here, Mr. Replogle pointed out that there is a psychological peril when animate intelligence is confronted by a powerful swift-moving machine and that bright lights tend to increase the danger and stated that if conditions are so arranged that it will be safe for the animate intelligence, horse or man, provided it retains its self-control, that is all that can reason-



A driver cannot overcome dazzling effect of approaching headlights by turning on his own bright lights. For example, the point A which the driver B should see cannot be seen with the glare of approaching headlights in his eyes at any distance between 25 and 50 feet from the glaring lights

ably be expected. In short, any headlight that causes a dangerous situation even though the animate intelligence retains its self-control, is a glare.

The thing most interesting to the approaching driver, stated Mr. Replogle, is the ability to see the road and to avoid the ditch, and to do this there must be a minimum relation between the light shining in his face and eyes from the approaching headlights and the light on the road.

Pointing out that it is a superstition to believe that a driver can overcome the dazzling effect of an approaching car by turning on his own lights, Mr. Replogle applied this detail to the problem of glare by an example using two principal points;

A, the roadway which the approaching driver endeavors to see in order to steer correctly; B, the eyes of the approaching driver. Placing point A 5 feet to the left of the fenders of the car carrying the headlights and about 4 feet in front of it as the point on the roadway which the driver is trying to see, and placing point B, the eyes of the driver approaching, not less than 3 feet from the ground and between 25 and 50 feet from the headlight, he showed that the eyes at point B will be dazzled by the glare if the light striking them is much greater than the light from the headlight that strikes point A. Experiments, he stated, had proven that when the illumination at point B is more than

four and one-half times that at point A, the light constitutes a menace and should be termed glare.

To prove these remarks, Mr. Replogle used a headlight, a 15-candlepower light, and a piece of steel ending in a circle and attached to a rheostat, asking several members present to peer through the circle at the object before and below the headlight until they could distinctly distinguish it. The light was made more and less powerful until found correct. Later in the evening these tests were checked and found to correspond to previous ones that produced the estimate of four and one-half. Mr. Replogle also introduced an instrument he has devised and which he calls a glaremeter, a device which may be used in conjunction with his estimates to discover glare.

Others followed the address by short discussions. Dr. Louis Bell, Boston, Mass., associate of Thomas A. Edison, in the Edison laboratories, objected to the distance of 25 feet specified by Mr. Replogle, and pointed out that when two motor cars operating at 30 miles an hour are close to one another they must pass at a speed of 88 feet a second which would not allow sufficient time if the drivers had to wait until they were so close to determine their movements.

Many Requests for Glare Eliminators

E. C. Patterson, president of the Warner-Lenz Co., Chicago, made a short address telling of the numerous communications his concern receives constantly that inquire for means of eliminating glare. E. F. Wackwitz, of the Gray & Davis Co., objected to Mr. Replogle's ideas and stated his belief in the ability to regulate glare by regulation of filaments and reflectors, and said that insufficient light caused more harm than glare. W. E. McKechnie, of the Cadillac Motor Car Co., and chairman of the committee on headlight glare, gave a brief description of the work of the committee and declined to announce results of tests pending their completion. J. Caldwell, of the National Lamp Works, recommended parabolic lamps arranged with high and low-power bulbs for city and country driving. He also stated that various experiments made by his company led it to believe that most devices that cut the intensity of beam tend to limit the view of action and that the best plan would be to eliminate the light from the upper angles by tilting it downward to an angle one-half of the angle equal to the spread of the beam.

Mr. Replogle, in a short summary, answered the various criticisms, stating: "Glare as I used it is only jargon and not at all scientific and I mean by glare merely the headlight proposition we discussed here tonight. If 25 feet is safe it is also safe when the distance is 200 feet. Contrary to Mr. Wackwitz I believe that it is glare and not insufficient light that causes the hazard. Decrease the light in the eyes of an approaching man or increase the light on the road and you eliminate the danger."

Woman in High-Gear Hill Climb

Movie Star Sends King Up Mountain

WHILE motor car manufacturers are delving into the problem of proper exploitation methods for the coming year, let them consider the fact that a Los Angeles woman climbed Lookout mountain in California on high gear in an eight-cylinder King. While the stunt itself is unprecedented and deserving of applause for itself, the thought for motor car makers is the possibility of exploiting motor car ability and advantage by turning the spotlight from the man pilot to what women can do in the way of unusual driving.

The majority of records for motor car accomplishments have been made by men. This achievement by Miss Helen Gibson and the transcontinental road records of other women easily prove that it is time to give the woman motorist an opportunity to demonstrate her ability.

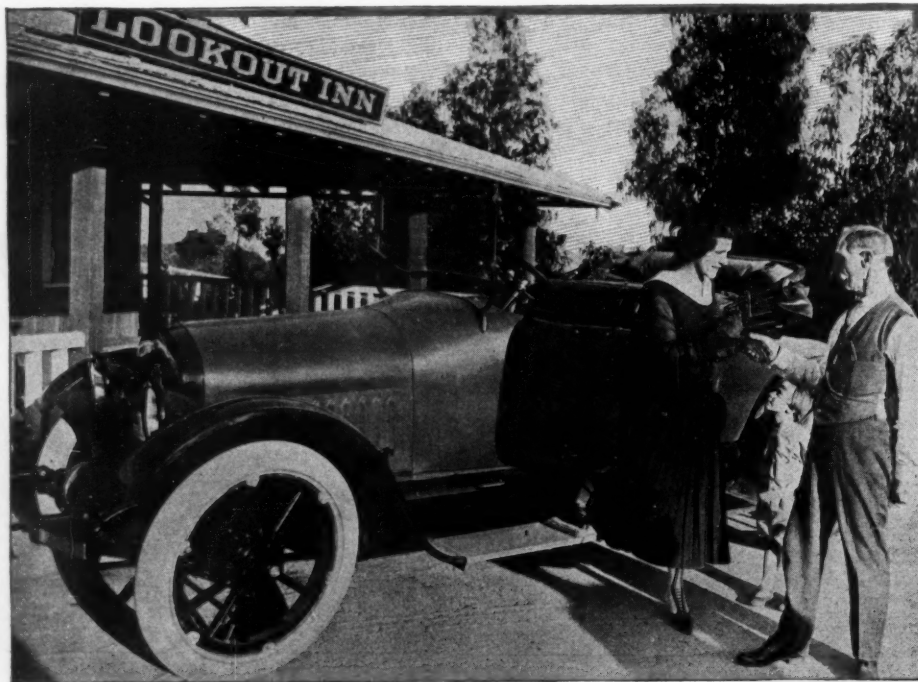
Whatever a woman does in this era is

looked upon with considerable interest. It places a human interest in the feature so that the accomplishment by a woman is of importance in itself. Miss Gibson's climb might go down in the records because she made it first and because it was a problem that brought forth driving ingenuity.

Miss Gibson started on her trip with the shifting lever removed and the gears sealed in high. At the hour selected hardly any traffic was on the mountain grade. Miss Gibson took it easy and increased her speed as she went up.

Miss Gibson said it was not risky, but there is a long stretch on this steep incline before approaching the switchbacks that usually makes it impossible to take the entire distance on high gear.

Miss Gibson is known in the moving picture world for her participation in rodeos and wild west events.



Helen Gibson in King after high-gear run up Lookout mountain in California

How Resta Won the Vanderbilt Cup

(Concluded from page 15)

was fifth to start and first to finish the first lap. He was setting the pace at better than 90 miles an hour and fans who have seen all Santa Monica races were predicting the strain would tell, or else his car was the marvel of the age.

A California crowd is patriotic, and although Resta's prowess was well known and Cooper is a local driver, Aitken was believed to have the best chance of any American driver against the invader.

Cooper played his old game of safety first and consistency. He knew he could not go into and out of the one right-angle turn as fast as the Peugeot drivers, who were helped materially by the brakes on all four wheels of their cars. He knew, too, that he must conserve his car for the Grand Prize, as the second car he had sent out from Indianapolis came to grief in practice. His driving was typical of Cooper. Past years had taught him the race is not always to the swiftest, and he refused to increase his pace when near the end and Resta had almost lapped him.

Weightman a Surprise

The surprise of the race was found in William Weightman, who recently purchased two Duesenberg cars and signed up Eddie Rickenbacher to drive one of them. This was the first professional contest for Weightman. He showed a clear head, taking a pace and holding it. He could have gone through the entire battle without a stop, but Rickenbacher summoned him to the pits after he had been given the green flag and insisted he take on gasoline. His position was certain and there was no reason to take chances. The cub bear mascot in the Duesenberg pits made good for his owner, although Rick was one of the first to withdraw.

The contest was remarkably free from tire troubles. Only four changes of shoes were made. Carleton put on one rear, which exhausted his supply of the old style clinchers he was using. In the twenty-second lap, Cooper made a change on the course and subsequently stopped to take on a spare and add gasoline to the tank. In the twenty-fourth lap Resta made a change for safety sake and also took on gas, getting away again in 50 seconds. The Mercer pits, which hold the record for quick tire change, put a right front on Pullen's car in the twenty-third lap and the car was delayed only 32 seconds. Pat-



Resta and Cooper discuss prospects just before the start

terson's Hudson, which almost failed at the start, improved as it went along and never came into the pits.

Ignition seemed the chief cause of trouble. Spark plugs were changed frequently. This was attributed to the fact that it was necessary to cut down speed for "death turn" to 30 miles an hour, and then in opening up again for the long straight-away the oil would foul the plugs. Although the course is practically at sea level, there was nothing in atmospheric conditions that could have made so much trouble.

Great care was taken to prevent accident. Only those whose duties demanded that they be there were permitted on the course anywhere near the start and finish line. Motion picture camera men were barred, although they were on hand to the number of about fifty, and seemed very much chagrined to think they could not set up in the middle of the street. A company of comedians was on hand expecting to pull the rush act at the finish when some painted siren would rush up, throw her arms about and kiss the winner, while the crank hummed busily.

But it was not to be so. Strict orders had been issued that nobody but officials were to be allowed on the course, and the burly police carried out orders to the letter. The comedians had to content themselves with confining their antics to the grandstand and boxes. Dozens of scenarios had been written for presentation contingent on this race, but the hero feature will have to be faked in at some later time.

The same control of the crowd that was noticed in front of the stands obtained entirely around the course. It was due to this fact, drivers say, that they were able to make such good time. They did not need to fear spectators would break across the road, so concentrated their attention on their driving. The line of police and guardsmen was polite but firm.

When the number of cars thinned out near the finish and there were persons who

insisted they must cross, an officer would provide personal escort after looking carefully to see that no car was approaching. As the result, there was not a single accident of any kind reported as attributable to the Vanderbilt race.

For the first time in 4 years, it was not necessary to postpone the Vanderbilt because of weather conditions. In 1915, at San Francisco, the date was set back twice and the race finally was held with the rain pelting drivers and spectators. At Santa Monica, 2 years ago, the worst flood in southern California's history washed out a part of the course. At Milwaukee there were two postponements.

Attendance 65,000

The attendance at today's race was estimated as 65,000. The grandstands were filled. Approximately 20,000 cars were within the inclosure and they lined the 8 miles almost hub to hub. It was an extremely well-behaved crowd.

If W. K. Vanderbilt retires his trophy, as he is said to have threatened, now is the time. The race can be truthfully said to have died in a blaze of glory. It has been held on the Santa Monica course twice and each time a new record was hung up.

Oldfield was excused because his car was not ready. Lentz did not report and may be disqualified. Agraz, Durant and Palmer did not get their cars ready.

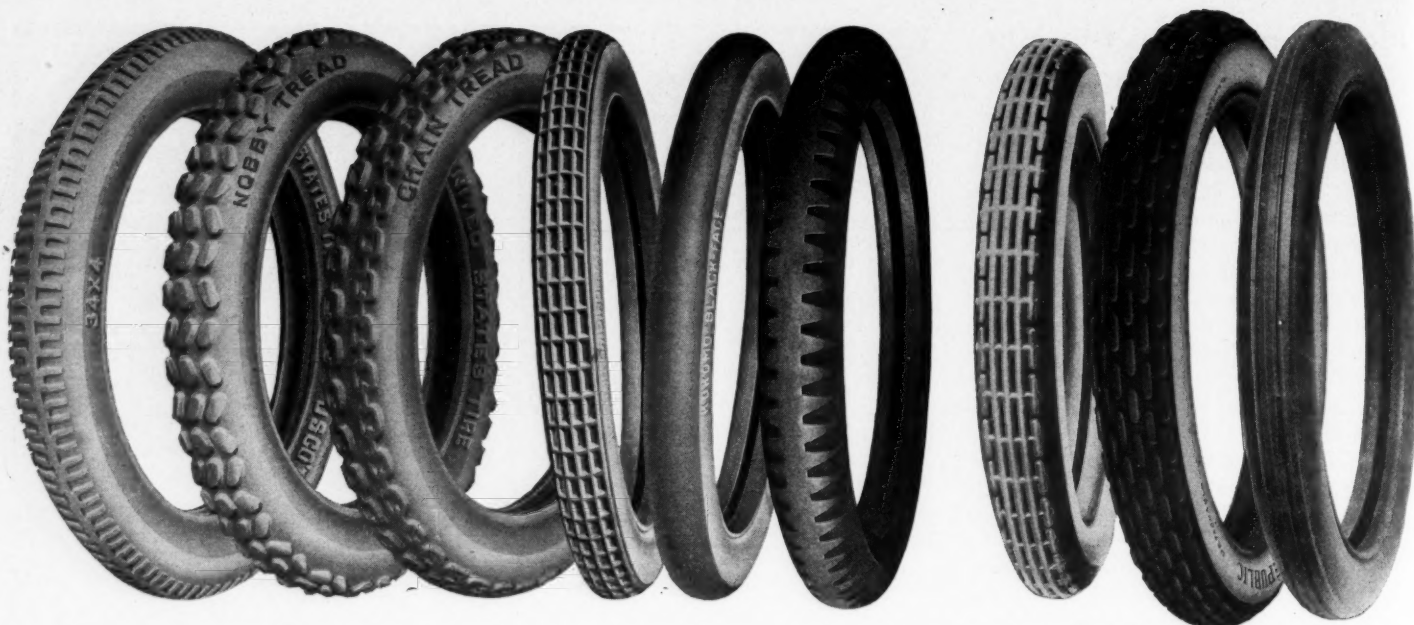
Fourteen starters in the Vanderbilt cup race used Rajah plugs as did the first six finishers, except Resta and Patterson. In the Grand Prize the same number of starters used Rajah plugs and of those finishing all, except Aitken and Patterson.

NEW RACING CAR FOR 1917

Chicago, Nov. 20—Ora F. Haibe, backed by C. W. Gillett, a Chicago sportsman, is building a racing car that will be entered in the speedway events next year. Present details are rather meager, but it is known that a six-cylinder, twenty-four-valve motor with overhead camshafts will be used.

ELIMINATIONS AND REASON THEREFOR

Car and driver	Reason	Lap
Gandy, Price.....	Burned clutch...	4
Cody, Cody.....	Axle trouble....	5
Duesenberg, Rickenbacher.....	Sheered gear....	6
Owl, Carleton.....	No tires.....	6
Mercer, Ruckstell.....	Ignition.....	8
Qmar, Toft.....	Broken rod....	9
Jackson, Marmon.....	Motor trouble....	10
Duesenberg, Moosle.....	Stuck valves....	11
Mercer, Thomas.....	Radiation.....	12
Duesenberg, Buzane.....	Cracked cylinder	15
Peugeot, Aitken.....	Broken valve....	19
Mercer, Pullen.....	Motor trouble...	31
Chowchilla, Bolden.....	Broken crank...	31



From left to right—Three non-skids of the United States, non-skid and plain treads of Kokomo Rubber Co., Redwall tread, Diamond non-skid, Republic staggered tread and the Double Fabric Tire Co. cord tire

A Season's Unfoldment in Tire Making

Non-Skids Demand Over 75 Per Cent of Output

WORKING on a basis of averages compiled from the reports of over two score tire manufacturers, the present tire demand calls for 77 per cent of the production of the tire factories in non-skids. Of all tires built, approximately 43 per cent are of the straight-side type, 33 per cent straight clinchers and the other 24 per cent in quick-detachable clinchers.

These figures are significant in showing the trend of favor for the various types. For instance, the demand for non-skids has grown in leaps and bounds. The lowest percentage of non-skid output which was reported is 39 per cent, and this from a manufacturer who has only recently introduced the type. This was the only report

By Wallace B. Blood

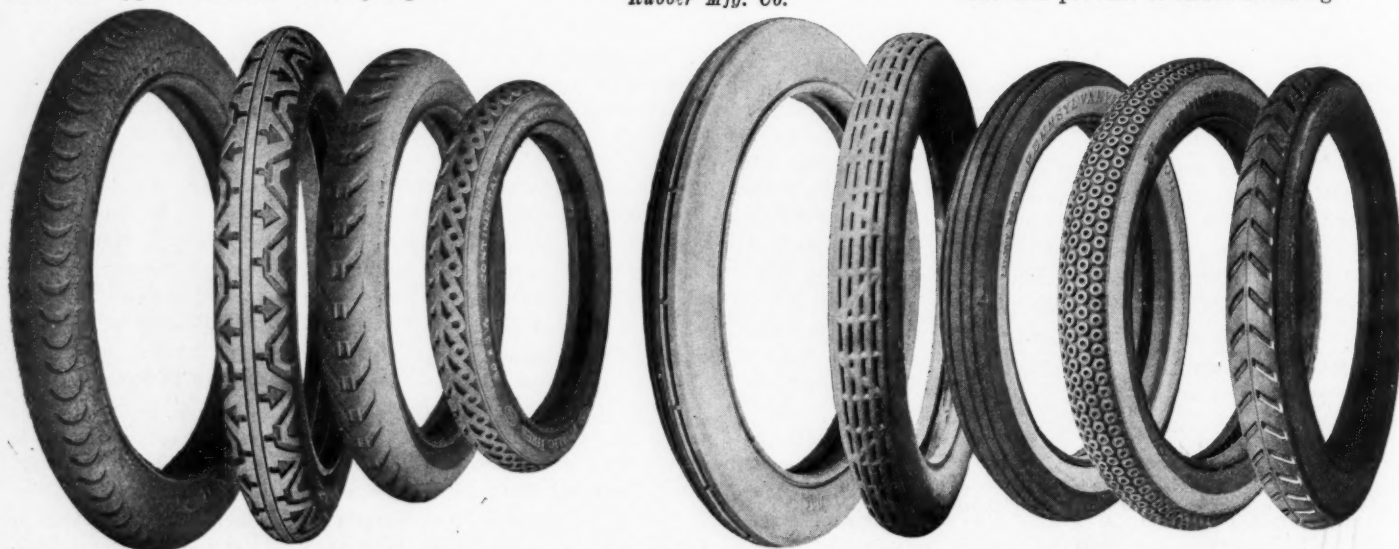


Impression non-skid tread of Combination Rubber Mfg. Co.

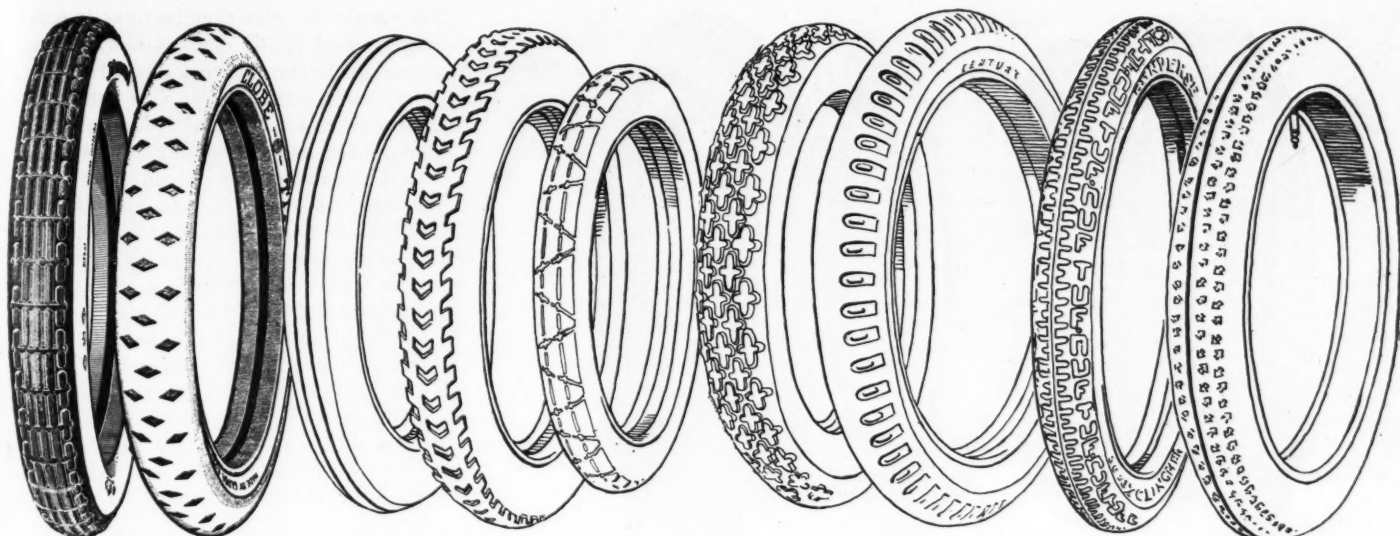
in which non-skids did not constitute over half of the output.

The 43 per cent figure for straight side tires speaks for a big stride of preference for this type. It is well to remember that of the 33 per cent of straight clinchers a majority of these go on Ford cars. The quick detachable clincher production is almost entirely to take care of old cars, as this type was in vogue several years ago, and it is reasonable to suppose that several more years will reduce this production to a figure too small to be considered.

The rush for non-skids speaks for two things. One is that for which they were primarily intended, namely, to grip the road and prevent or lessen skidding.



From left to right—Falcon non-skid, Victor non-skid, Hardman sure-grip tread, Vitalic from Continental Tire Works, Kelly-Springfield corrugated, Norwalk high-pressure, Pennsylvania ebony tread and Vacuum cup and the Indiana traction tread



From left to right—Diamond non-skid, Globe, Sterling hand-made corrugated and non-skid, Empire, Packard of Pharis Tire & Rubber Co., Century, Converse tuff-e-nuff, and Hood arrow tread

The second reason is that, without much more cost to the tire maker more of the tread surface is brought against the road, distributing the wear over a greater surface—balancing the tire so to speak.

It is interesting to find that the majority of the plain-tread casings go to the South and Southwest. Non-skids find their big field in the big northern cities and are preferred over the plain treads in the northern rural districts. The reason for this probably is that there are few large cities in the South and a large portion of the rural roads are a combination of sand and clay which retain their gripping qualities regardless of how wet they are. Snow and ice also call for non-skids in the northern states.

The increasing demand for straight-side tires comes from the recognition of the advantages of this type. Clincher tires are favored in foreign countries and for that reason export shipments figure in swelling the averages for this type. Probably the greatest argument in favor of the straight-side is that the sharp bend in the tire ma-



From left to right—Racine horseshoe, Savage wrapped tread and Savage non-skid

terial at the rim is eliminated. Thus, the liability of rim cutting is minimized. Then, too, the straight-side permits a broader base, giving the inflated tire more stabil-

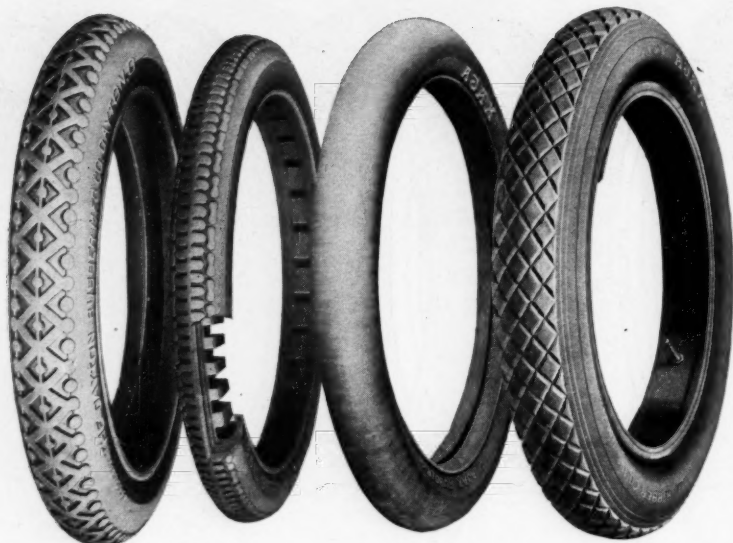
ity when turns in the road are encountered. The straight-side embodies a very sturdy bead which is generally in the form of piano wire moulded into the tire material. This rigidity feature is, of course, an impossibility in straight clincher construction, because these must be soft beaded to allow stretching over the rim.

Going into the matter of price, the construction cost of a straight-side tire is very near the same as that of a clincher. In the non-skids the building cost is enough greater so that the manufacturers have, in an average estimate, deemed it necessary to charge about 9 per cent more for them. This extra charge varies from 5 to 15 per cent.

Around the cord tires probably hinges the greatest interest, as far as the user is concerned, of the year. Let it be stated that the price of cords is 25 to 30 per cent greater than fabric tires and from all appearances will be for some time to come. Owners who have thought that, as the cord tire industry matured, the price would go down, as it did in the motor car industry



From left to right—Archer corrugated, Endurance, General non-skid, Carspring, Fisk studded, Kelly-Springfield, and the Goodyear cord and all-weather treads



From left to right—The Dayton tread and view of interior construction of Dayton airless, and the Ajax plain and non-skid treads

itself are due for a disappointment. The very nature of the tire necessitates a higher price than the fabric and unless some unforeseen innovations come to light in the methods of construction the proportion of cost is bound to hold.

Until very recently the cord tire production has been entirely in the hands of Goodrich and Goodyear. After much experimentation other makers are now coming to the front with this type, among them being Firestone, already producing 500 cord tires a day. The Double Fabric Tire Co. is another recruit to the cord tire field. The tire is known as a duo-cord type, the same as the Goodyear type. Kelly-Springfield announces that it will shortly place on the market a cord tire. The Twin City Cord Tire Co., a new and growing concern, specializes on this type.

Reason for Cord Popularity

Cords get their following in their ability to withstand hard usage with a smaller amount of pressure than is found necessary in a fabric tire. It does not necessarily follow that it is advisable to carry small pressure in cord tires, but there is nothing that speaks for longevity more than a tire which will not give way when underinflated.

The cord tire is capable of withstanding a greater amount of bending in the side wall than is a fabric tire. When a fabric tire is put under load, especially when soft, one part of the fabric is compressed while another part is stretched. The tendency is to cause a split. With a cord tire the plies are so arranged that this strain is compensated.

In the matter of guarantee adjustments the average is 4,300 miles with a minimum of 3,500 and a maximum of 6,000.

Pressure standards remain practically the same and this standard calls for a tire gauge reading equal to between 18 and 20 times the cross section of the tire. In other words, the average recommended pressure for a 3-inch tire is from 54 to 60 pounds.



On the left the Firestone non-skid. The other two casings are Firestone cords

New offerings for the coming season include a variety of non-skids and a general favoring of black treads, red treads, a combination of the two, or a combination of black and white. One maker has introduced a brown and white combination.



Left to right—Braender bulldog; three views of Big 4 tire, showing sectional construction

This matter of color combinations is something to meet public demand and does not necessarily imply that a black tire is any better than a white one or vice versa. The rubber can be compounded into almost any color desired and, in keeping with the motor car manufacturing trend toward individuality in color schemes, etc., the tire manufacturers are taking advantage of this simple matter of compounding chemicals to give their products a tone which distinguishes them from other makes.

While on the subject of compounding of the rubber itself, there have been great strides in this direction in the last year or more. Tires are tougher than they were and the rubber is less liable to deterioration and withstands road abuse much better than did the compounds of a few years ago.

As to the matter of the tire business itself it is, of course, quite evident that the production is far beyond what it ever has been before. This naturally follows when it is known that car production has doubled and in many instances trebled within a year. Then, too, the proportionate number of old cars is constantly increasing. There are enough more new cars being built to overcome the average of those being discarded. The birth rate has exceeded the death rate for a number of years in car construction. To take care of this and of present car construction the tire factories have increased their capacities from 25 to 200 per cent.

All Builders Expand

Every concern in the tire business has found it necessary to expand. Examples of such increases are as follows: Firestone has added 11 acres of floor space and their business has jumped 62 per cent, Goodrich has added 21 acres, with a business increase of 40 per cent; Miller reports a 150 per cent increase, Braender 200 per cent. The latter has added 10,000 feet of floor space.

Marathon business increased in a year so that it was necessary to double the capi-



The Michelin non-skid which is being continued

One of the Mohawk group This is the corrugated

Federal studded tread

tal. This concern is contemplating a big expansion. The Alliance Tire and Rubber Co. succeeding the Alliance Rubber Co., with a capital of \$2,500,000 will have three times its present capacity by next spring. It will limit itself to 400 more dealers to take care of this trebled capacity which speaks for a demand which cannot be supplied.

The Gordon Tire Co. increased its output 50 per cent and added 3,000 feet of floor space, the Gibson Co. increased 125 per cent; Batavia, Combination, Dayton Airless, General, Hardman, Hood, Lee, National Rubber Co., and other tire makers scattered over the country have felt the big-business wave.

The tread types constitute an interesting study in depressions, ridges, bosses, etc., which are designed to hold the tire fast to the road.

The Indiana rubber and Insulated Wire Co., has a new tire known as the traction tread the first of which will be ready for the trade about December 1. The projections of the tread will be just twice the width that this maker has used on the previous non-skids. It will have white side wall and a brown tread.

Federal is continuing the traffic tread, which has a black tread with gray side walls. Standard has two styles of non-skids, the velvet tread design being a new one this year. Diamond will continue its same line for another year.

The Batavia Rubber Co. plans to add a rib-tread type of the orthodox appearance and design. This company is now utilizing moulded construction instead of the former single-cure wrapped tread.

Fisk announces its 1917 tires as three in number: The plain tread, the non-skid and the red top. The red top, throughout is of heavier construction and is the high-priced tire of the line.

Manufacturing processes have been improved along the lines of efficiency. The multiple calendering operation, in which the fabric is impregnated with rubber, is now accomplished in one operation, whereas it previously required three.

Fabric cost has been on a constant up grade throughout the year. Reports show

that the increase averages around 100 per cent. Goodyear has stepped to the front with the announcement that it will grow its own cotton on its own plantations. Compounding chemicals have also felt the effect of the general soaring of prices.

The crude rubber market is more satisfactory than it was a year ago. This has had a tendency to wipe out the cheap tires made from revamped rubber.

Norwalk is featuring a black-tread tire with white side walls. An interesting feature of the inner tubes produced by this concern is that they are not ground in tubing machines, but instead are made by laying thin plies of rubber together which are welded into an air-tight tube. This laminated construction is claimed to have great strength.

Globe Offers Two Types

Globe tires are offered in two types, one the good-grip tread, which is a non-skid, carrying a 6,000-mile guarantee and the plain tread with a 5,000-mile guarantee.

The Savage Tire Corp. makes a non-skid with a raised tread of the impression type. The grip tread is made by using sub-side plates over the regular side ring, by the wrapped process. National makes a black-tread non-skid known as the speedway red-wall. This is new this year.

In the new offering of the Hamilton Rubber Mfg. Co. the outer surface is moulded so that in the tread are imbedded three prominent cables, which are to prevent the car from skidding sideways, but do not hinder by suction or roughness the forward movement of the car.

Tire production figures among the bigger makers show a tremendous business. Goodrich is producing about 20,000 tires a day. Machine made tires characterize the Goodrich product and a great amount of money has been spent on development and increase in this equipment. Firestone is



Federal black corrugated tread

Hamilton traffic-tread tire

Gordon triangle non-skid tread

building 12,000 fabric tires and 500 of the new cords daily. Miller will have turned out 300,000 casings during 1916 and will increase the production to 500,000 for next year, according to present plans. Empire is building a few cords and expect the portion of this type to increase rapidly in the 1,000 a day output. Ajax is now producing 1,700 to 1,800 single-cure process tires a day. The New Jersey Car Spring and Rubber Co. reports an unprecedented increase.

Michelin Late Model

Practically no change has been made in the Michelin line this year. The newest model is only about a year old, this being the universal non-skid casing which is made with both clincher and straight-side beads. Additions have been made to the factory throughout the year and a large three-story building has been started which

will nearly double the production capacity. Michelin has solved the difficulty of getting moulds, which is confronting many



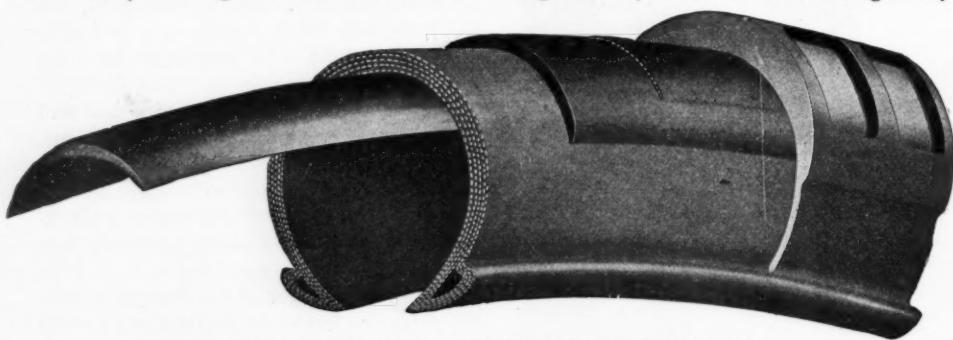
Two of the Quaker tires, a non-skid and plain tread

makers who are building big additions. The company is doing this by making its own models, and now has a complete line, including the 30 by 3½ size. There is a unique installation in the tube department which is the circular mould upon which the red-rubber inner tubes are made. This conforms to the shape of the casing. The company claims that the tube is thus in shape when normally inflated. The 30 by 3½ and 31 by 4 type are offered in soft-bead clinchers.

Three styles of non-skid treads are in the line of the Pennsylvania Rubber Co. The vacuum cup, ebony tread and the new bar circle have mileage guarantees of 6,000, 5,000 and 4,000 respectively. These are all single cured on a steel mould, the materials being the same, but differing in the style of tread, thickness, and fabric plies.

The Converse Rubber Shoe Co. is offering what is known as the triple-tread tire. The method of manufacture involves a tread assembly built over a steel core. The number of plies of fabric is unusually large. The final treatment is with unit wrapped tread curing.

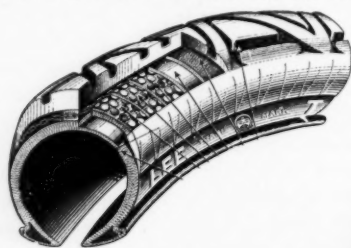
There are new makers coming into the business, and the largest of these is the Brunswick-Balke-Collender Co., makers of billiard tables, bowling alleys, etc., which has equipped a factory for fabric tire production. The tire will be a single-cure wrapped tread. Another newcomer is the



Internal construction of Leather Tire Goods Co. casing



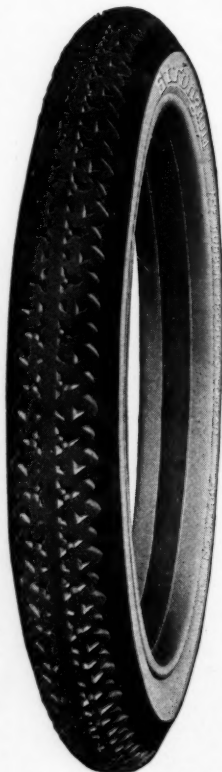
Swinchart's latest offering in the non-skid line



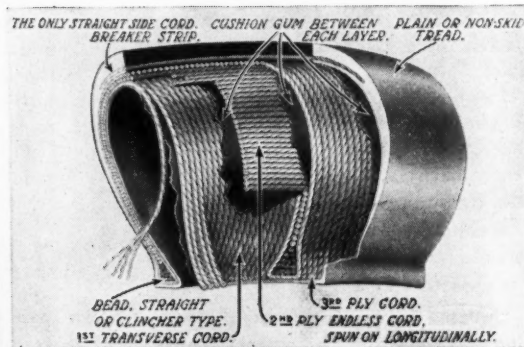
Section showing construction of Lee "puncture proof" tire



Braender wrapped tread tire



Stronghold tread of Rubber Products Co



Sectional view showing construction of the Twin City cord tire

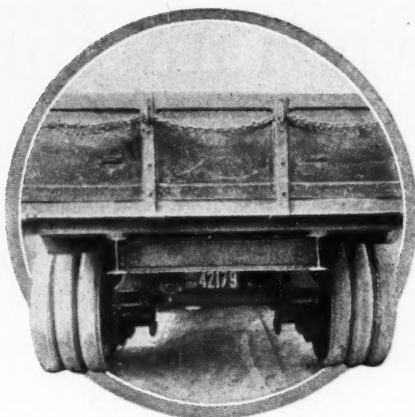


The Marathon casing with whipcord carcass and angle tread

Gryphon Rubber and Tire Corp., New York, which will be ready for delivery with its Gryphon grip-on tread by the first of the year. This tire carries a 5,000-mile guarantee. The Sebring Tire and Rubber Co., is already building.

HOOD COVER PATENT INFRINGED

New York, Nov. 21—Special telegram—In a decision here yesterday the Livingston patent No. 1,156,017, covering a mask for concealing the engine and radiator casing of a motor car comprising an engine hood section and a separate radiator hood section, the assembly having streamline tendencies, was held valid and infringed by the Lawco radiator shell and hood made by the F. H. Lawson Co., Cincinnati, O. Suit was brought by D. McRae Livingston and his licensee, the Ospeco Mfg. Co., against the Lowe Motor Supplies Co.,



The new Kelly-Springfield triple-tread for very large trucks

charging that the Lawco device sold by Lawco and manufactured by the Lawson concern infringed the Livingston patent. Judge Sheppard contended no wilful in-

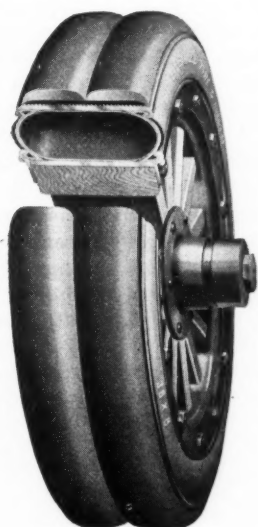
fringement was evident but that the Lawco construction was so similar to that specified in the patent he could only hold the latter infringed. The suit was in the United States district court for the southern district of New York.

FIRE DAMAGES SAXON PLANT

Detroit, Mich., Nov. 20.—Fire at the plant of the Saxon Motor Car Corp., today, damaged a structure used for truck production, and a part of the building used for offices, to an extent estimated at \$60,000. The loss is covered by insurance and will in no way hinder the production of the concern. In fact, production was in process within 1 hour after the fire had been overcome. The fire was started by an employe who held a lantern while he poured gasoline into the truck tanks. Three trucks, costing \$15,000, were burned.

New Solid Truck Tires Have Deeper Sections

Pneumatics Are Becoming Favored Even for Heavy Trucks



Unique construction in Big 4 tire. The steel and rubber tread over pneumatic is said to give long life and less vibration

THE trend is toward more resilient tires for trucks. In the main, the depth of tire section has been increased giving better riding qualities as well as greater wear. Cushion tires for heavy duty and

large single tires are increasing in popularity. Pneumatics are beginning to be used even on the largest trucks.

Pressed-on tires as distinguished from the demountable type are fast becoming universal equipment on solid-tired trucks, the demountable type being in demand principally for trucks used in country districts remote from tire service stations where hydraulic presses for their removal and replacement are available. The pressed-on tire is lighter and stronger and tire service stations equipped to do this work are becoming so common that even the truck owner in outlying districts does not have to go very far as a rule to have his tires changed.

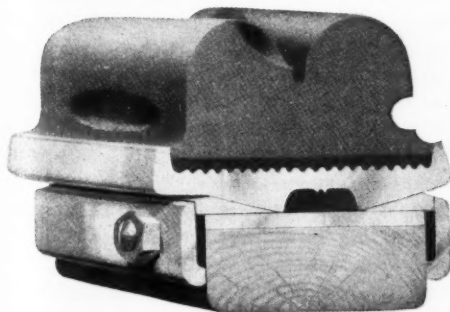
The United States Tire Co. has changed the tire section so that increased wearing qualities are obtained with the same amount of rubber. Formerly the steel rim which forms the foundation was a deep channel section with high sides. Now the sides are very low which, in effect, increases the depth of the section although actually it is not quite as great as heretofore. A change in process has also been put into operation by the U. S. company—the tires are now vulcanized under 800 tons pressure instead of 250 tons in order that all possibility of moisture and gas in the rubber is eliminated.



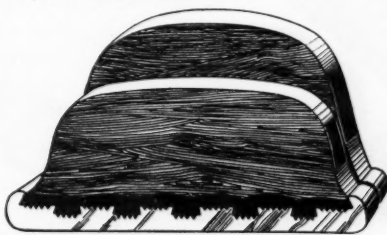
Firestone giant tire. This is made up to 14 inches in width and is designed for very heavy truck loads

Firestone is bringing out a 14-inch single solid tire as an addition to its Giant line consisting of tires from 8 to 14 inches. The depth of channel is reduced.

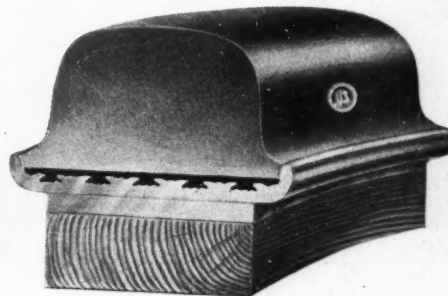
(Concluded on page 51)



One of the newer types of Goodyear solid truck tire



Showing the deeper section of the new Goodrich de luce



The new United States truck tire has a deeper section

Keeping Down Tire Bill



Injury caused by vicious application of the brakes

IF time, expense and trouble are to be at all considered there is no more important question relative to the running of a motor car than the care of the tire casing and it may be said right at the start that, as a general thing, there is no part of the machine which receives as little proportionate attention. It has been estimated that the expense of upkeep of the machine is divided into three equal parts, namely: fuel, including gasoline and oil, tires and general wear and tear of all the other parts of the machine put together. By this is meant that each of these three divisions, if they may so be termed, is responsible for one-third of the actual expenses of running the car. It must be remembered that tires

Mileage Can Be Doubled by Proper Attention to Pressure and Small Abrasions

cost one-third the total expense, providing they are given proper care. If they are neglected their cost will run above this one-third figure. The motorist, as a rule, worries a great deal as to how many miles he can get out of a gallon of gasoline, but when the figures here presented are considered, it would seem that the owner of the machine would be money in if he would, in addition to counting the miles per gallon, give the care and repair of the casing a little more attention.

One of the big items in operation of the modern tire factory is that of making replacements—giving a new tire in the place of a worn out or ruined casing which when purchased was guaranteed for a given number of miles. Frank R. Carroll, Los Angeles, Cal., manager of the Goodrich Rubber company, stated recently that fully 75 per cent of the tires taken back to him as "defective" in some particular are not defective at all, but have simply been subjected to some sort of abuse or misuse. Many motorists purchase casings with the feeling that if the tires do not run out the full guarantee of 3,500 or 5,000 miles, regardless of the treatment given them, replacements or mileage can be secured from the tire company. They do not figure that with proper treatment those same casings will, as a rule, make from 8,000 to 10,000 miles and sometimes more, thereby giving the motorist several thousand more miles than he would receive otherwise, even with replacements, not to mention the assurance of having a set of good tires under the car.

Of the many ways in which the casing is

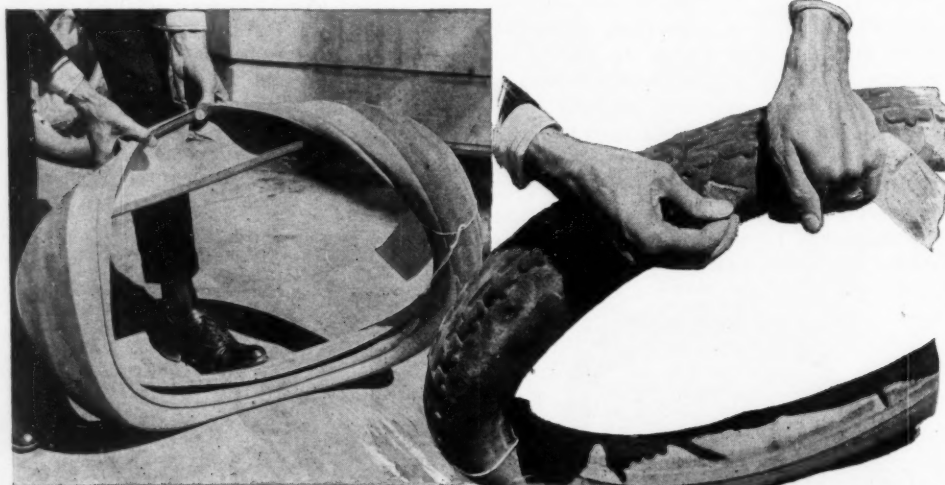


This blowout is the result of a neglected cut on the tread

subjected to abuse possibly the two most common are overloading and under-inflation, the results of which are identical. That these misuses have been given a tire is indicated either by a wavy condition of the tread, showing that the adhesive friction between the layers of the fabric have become overheated through this cause, or by bad cuts along the sidewalks or along the rim. A rim-cut tire is an easy victim to blowouts. Unquestionably there are more tires ruined on account of under-inflation than from any other one cause. This particular cause of trouble will not only result in a ruined casing, but is also responsible for tube troubles. Common sense will tell one that if the tire which is run soft is indented by a curbing or stone until the tread bumps against the beading or rim, the soft inner tube within it is bound to suffer. Keep the tires pumped to the pressure recommended by the manufacturer.

Sometimes a tire may be run for weeks after the fabric has been broken before the blowout occurs. The blowout may occur while the car is standing in the garage or on the street. Sometimes a few of the plies of fabric were broken, this opening sufficiently to pinch the inner tube, allowing the tire to deflate gradually. Another cause of trouble similar to the stone bruise comes through rough handling of the car going into the curbing. A sharp corner of the curbing coming in contact with the side wall of the tire causes an injury which may not be noticed at the time, but which so weakens the layers of the fabric that at a later date serious trouble results.

Another common trouble which eats up perfectly good tires is mis-alignment, where the wheels are not correctly lined up. In a case of this kind the tires are continually skidding and it is this constant grinding away of the tread that causes the fabric to show through and for the motor-



A stone bruise which cannot be seen from the outside of the casing

If this cut is not repaired, it will soon grow into a blowout

ist, as a rule, to condemn the tire as well as the tire maker. Faulty alignment usually occurs in the front wheels, and may be caused by a sharp bump of the wheels against the curbing or other obstacle. Instances have presented themselves where, on account of faulty alignment, a tire has been worn so badly as to be ruined within a distance of fifty miles. The act of lining up the wheels is not a difficult one if the motorist has the knack, but if he does not know how, the car should be taken to some experienced repairman and the work done right. As a rule when the front tire is affected both tires will show damaging results, although very often only one tire is affected. Improper adjustment of the steering apparatus or a bent knuckle or axle will cause this trouble. It is to be assumed that all cars are received from the manufacturer in perfect alignment, but after being run a while the steering gear, if neglected, is very apt to become affected.

Neglect to properly repair cuts in the casing will eventually lead to blowouts. When the driver finds, after a trip, that one of his casings has been cut through the tread by a piece of glass or other sharp article he should immediately repair the injury with some plastic compound. If this is neglected dirt, water, oil, etc., work their ways into the fabric with the result that this becomes rotten and weakens, ending in a blowout sooner or later. Very often a tire so treated is taken back to the seller as defective. To repair a cut it is not necessary to remove the tire, providing of course that the cut is not too large. Simply clean the cut out thoroughly with gasoline and press into the opening a piece of one of the remedies provided for this purpose. If the motorist neglects to repair his tire cuts he must not wonder if blowouts occur.

Running in Ruts

Another source of trouble is running in car tracks or ruts, as well as running the tires against the sides of curbs. The results of this carelessness is the wearing of the rubber from the wall of the tire, thereby exposing the fabric. This little example will illustrate: If a person were to walk down the street, taking each step so close to the curbing as to allow the upper of the shoe to drag against the curb, how long would it be before the upper would be worn through, yet the sole unaffected?

Taking the corner too fast so that the rear tires skid during the turn is another common and costly error of the average motorist. Skidding around one corner may do the tire more harm than running for miles straight ahead on the improved roads. There is really no call for rounding the corner on the jump, and the fellow who does it generally pays for his sport in lost mileage. The same is true about locking the brakes and sliding the rear wheels. There have been times, when the machine has been carrying a good load at a pretty good speed that the locking of the brakes has resulted in a whole section of the tread being torn from the tires. The first thing



Rim cut caused by overloading or under-inflation

a motorist thinks of in a case of this kind is that the tread of the tire is defective, and back to the seller goes the tire, providing it has not gone the required distance. Little do many of these fellows who take tires back on account of defects, realize that at a glance the tire men can tell the real cause of nine-tenths of the average tire mishaps.

Another cause for a lot of the returns, the tire men tell us, is the using of a straight sided tire on a clincher rim. There being no lip on the bead of a straight-sided tire, it naturally follows that there is only one narrow line of contact between the clinch of the rim and the bead. This results in a ridge being gouged into the side

WELFARE WORK AT REO PLANT

Lansing, Mich., Nov. 16—The Reo Motor Car Co. is devoting its efforts toward welfare work for employees. A number of interesting and valuable methods devised to aid workers have been installed. The welfare work branches into a number of different departments and is done under supervision of department heads or by committees of men and foremen.

The safety committee comprises a chairman, who gives his entire time to this work, and seven members each representing a division of the factory. Through this committee a constant watch is maintained on the machines and safety appliances and the practices of the employees using them. Financial aid is given men, first through a fair wage, the minimum at the factory being 30 cents an hour. And a man in financial trouble receives additional help if the case is worthy, by means of temporary loans or adjustment with the creditors.

A real estate committee advises employees in the purchase of homes or the sale of real estate and is a great aid to foreigners unacquainted with conditions. The company also maintains a first-aid and hospital service, an industrial hall seating 1,600, four bowling alleys, a library and dining rooms.



Tread wear caused by wheel out of alignment

of the bead, this often causing the bead to loosen and become entirely worthless. Then, too, the clincher tire is sometimes placed upon the straight-sided rim. This often results in the bead becoming flattened and tearing loose from the remainder of the tire. A tire in this condition is beyond repair.

The motorist should remember that sunlight is one of the worst enemies of rubber. It rots and destroys tires very rapidly. It often happens that a spare tire which has been carried on a rear tire rack for several months, unprotected, will blow out after it has been used for several hundred miles. This tire goes back to the manufacturer as defective. A couple of dollars spent for a tire cover would have eliminated all of this trouble. The motorist has doubtless often wondered why the tire manufacturers so carefully wrap the casing in so many layers of paper, wrapped round and round the tire. This has been done to keep the casing from the light, moisture and air as well as its other enemies. This paper is often declared a nuisance by those who do not know its purpose when the tire has to be changed in a hurry.

Spare Tires Leak

Very often motorists who carry a spare tire seem to believe that just because the tire is not working it ought to hold air indefinitely. They forget that rubber is porous, and that if placed under a microscope that would magnify the surface two thousand times, it would be found to be full of holes. These holes are so minute that the air leaks through them very slowly. This leakage, however, is certain.

The pressure should be gauged every time the tires are pumped and possibly between times. It is not possible to go around to the different tires and by giving them each a kick, tell whether or not they are properly inflated, although some folks do this. The car owner should look over his tires at least once a week. The operation will take but a minute or two and is well worth doing.

The Tire Factory Life of Rubber

What the Raw Material Goes Through Before It Becomes Part of Motor Cars

MOST persons believe rubber is a pliable, elastic substance. It is sometimes an erroneous idea, and the thousands of rubber biscuits in the stockrooms of the B. F. Goodrich Co. at Akron, O., are excellent witnesses of that fact. These biscuits, constantly arriving from Brazil and other countries, are so hard that they must be treated before being placed in the crushing machine. They are reduced to a softer condition by means of huge vats filled with hot water, which eliminates sufficient hardness to allow the rubber to be broken into small pieces, after which it is washed and hung up to dry. The dried rubber looks much like dark brown knitted cloth.

Having dried sufficiently, the rubber is used for two tire purposes. Some is mixed with fabric to rubberize it, and some is combined with compounds to render it available for vulcanization. Both results are attained by great machines called calenders, which look like gigantic wash wringers and have three huge grinding wheels that are operated by a driving wheel about 12 feet in diameter. The rubber is forced through the grinding wheels and emerges in thin flat sheets. You may realize the immensity of the calender room as more than forty calenders are in operation with a capacity for turning out over 350,000 pounds of rubber daily.

After the rubber is mixed with the compounds and coloring powders, it is stacked about the room, to await its trip to the next department and looks like stacks of leather hides found in a stockyard or tannery. Some of the rubber is used for the



In this room the Goodrich company builds the complete tire, the rubber having gone through the process from hard biscuits to tire casing and tubes

manufacture of tubes. This is cut into narrow strips and doubled. The doubling process insures against leakage, as holes in either layer in all probability are blotted out by the other layer. The narrow strip then is directed to an overhead conveyor chute that carries it to a floor above. Here the conveyor may be seen extending hundreds of feet along the ceiling and finally dropping downward at a slight angle until it reaches a table, where the rubber emerges and enters a machine that doubles it again and passes it to a small electric trip-hammer that makes a joint in the new juncture. It is still in motion and passes to a worker at the table. He stands with a shears and as the rubber reaches certain tube lengths as defined by marks on the table, he cuts it off, so that the rubber lying at the end of his stand looks much like the ordinary tube but is

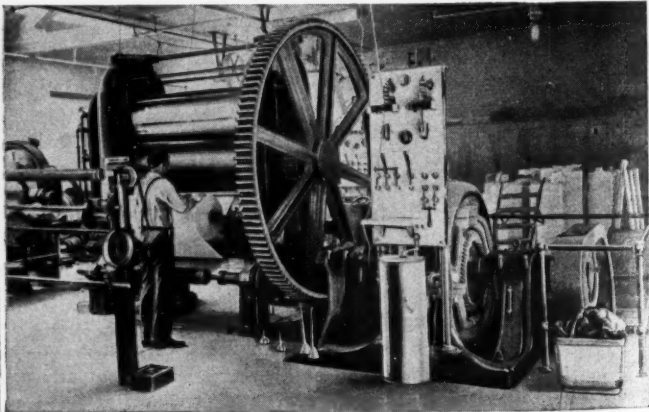
open at each end and is minus the valve patch and valve stem.

The hundreds of tube lengths are carried to the vulcanizing room, where they receive valve patches, are placed on narrow iron tubes called mandrels and are wrapped by a mechanical process in damp strips of cloth. They then are stacked on roller conveyors and run into ovens capable of curing 150 tubes at a time where they are subjected to heat until cured.

After vulcanization the tubes are unrolled from the mandrels and sent to the acid-cure room, where they are joined into circular tubes and begin to have a resemblance to the tube known by the motorist. Each end of the tube

is placed through and over a metal sleeve and turned back leaving a 4-inch cuff. The cuff is buffed and coated with cement containing an acid that cures the rubber chemically, eliminating need for heat. While awaiting complete drying of the cement, the valve stem is attached to the tube. The two ends are then removed from the sleeves and firmly joined in a leak-proof connection. The tube is sent to the test room for final inspection. The test room has a capacity for 9,000 tubes daily and contains many large tanks filled with water, into which the inflated tubes are placed to determine any imperfections. From here the perfect tubes go to the stockrooms or shipping department.

The casings are made in two separate departments, one making the fabric tires, the other manufacturing the cord tires. Fabric tire manufacture begins in the fabric



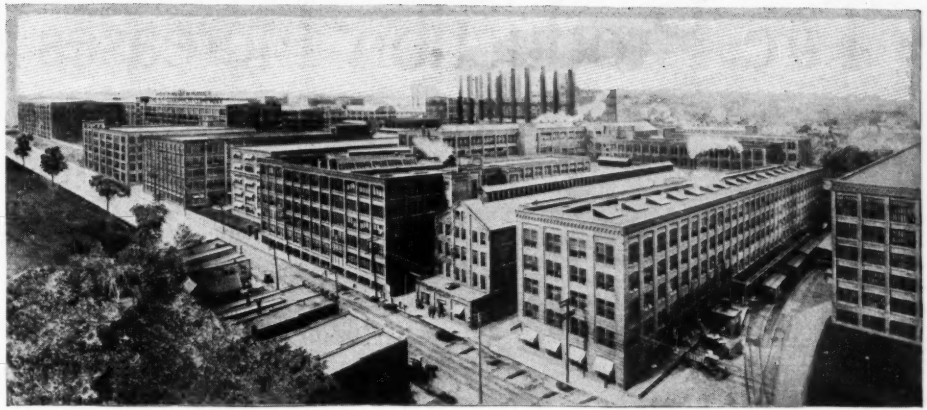
The mill room, shown at the left, is said to be the largest in the world. One of the calenders it contains is shown at the right. These machines grind the rubber and form it into the thin sheets that are used to manufacture the tires

room, where a huge machine, 20 by 6 feet, cuts the fabric at a 45-degree angle into the various tire lengths. The material is cut at this angle to produce greater resiliency. The fabric is then sent to a splicing room, where the strips are cemented together to make the complete lengths needed for the interior wall of the casing, the lengths ranging from 12 to 18 feet. The foundation of the tire begins with the fabric which is built over an iron wire. It looks much like the ordinary casing in its structure. The core is placed in a spider directly before a feeding machine, which rolls the fabric strips, pulling them to an even tension and placing one layer over another until complete. The first layer is wider than those succeeding and the overlapping material is later used to cover the bead. The bead, which gives the tire its durability of shape and also is used to make the straight side, clincher or quick-detachable clincher, as the case may be, is made of hard rubber covered with fabric. It is placed over the side of the casing after the several plies of fabric are arranged and held in position by its fabric cover.

Goes to Tread Room

The tire is ready for its rubber cover and goes to the side wall and tread room where the thin sheets of rubber, produced in the calender room, are cut into small strips. They are placed in position and hand rolled to secure a smooth and firm surface. It is here that the various styles of plain and non-skid treads are determined, and the room presents an odd appearance with its hundreds of wheels over which the workers fashion the tires and covered with the black, gray and red rubber used in their construction. In the finishing room, the surplus fabric and rubber is removed, and the tire goes to the vulcanizing department for the final operations in its manufacture.

The casing, still on the core, is taken to a huge oven and, with fourteen or fifteen



It takes 5 miles of tunnels to connect these buildings of the Goodrich factory. The total floor space equals 100 acres

others, is placed on a steel frame attached to the upper shell of the oven and lowered into the under part which sets deep in the floor and looks much like a well. Following a cure given with 500 pounds of pressure and 296 degrees of heat, the tire is removed, a finished product, ready to be freed from the core and wrapped in the narrow strips of paper used to cover tires for shipment. The paper is wrapped about the casing by an automatic machine requiring from 17 to 20 seconds a tire, according to its size.

Cord tires are constructed differently up to the point where the side walls and tread are applied, after which they follow the same course as the fabric tires. The cord is laid over the core by a machine. Entering the cord tire room, the first sight is a long row of machines placed along one wall, each containing one tire and supervised by a worker. A layer of gum is first placed over the core and then is covered with a layer of cord, after which another layer of gum again succeeded by cord is used to produce the cord tire foundation.

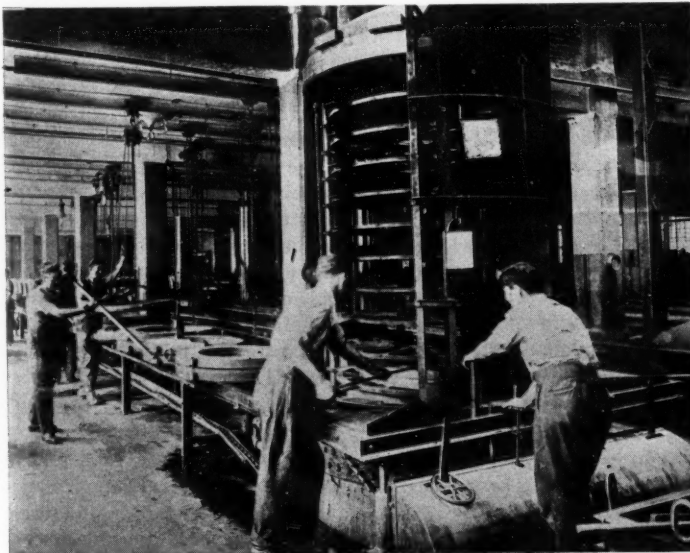
The first operation consists of placing staples that look much like the ordinary staples purchased in a hardware store about

the edge of the core where the bead eventually appears. The layer of gum then is laid over the center of the core, and the machine is ready for its work of laying the cord, or cable as it is sometimes called. The instrument has three arms, each equipped with a steel prong much like a human finger. The tire is placed in the machine between two arms and below the center one, with a ball of cable at one side of it.

Automatic Working

The center arm automatically moves to the cord, its finger picks up the cable and carries it to the center of the tread. Here the other two arms begin their work. They move to the cord and the fingers on each, taking hold of it, carry it to and around a staple on each side, working from one staple to the next as the center arm continues to supply the cord, until the entire casing is covered. This mechanical process insures an even tension throughout.

This operation is repeated for the second layer when the casing is ready for its side walls and tread and goes through the vulcanizing room and paper wrapping department until it is complete and ready for use.



After the rubber is first broken up, it is washed before being hung up to dry. It comes out of the washer in the form shown at the right. At the left is a photograph of the vulcanizing room where the tube lengths are cured

Tire Production Increases 65 Per Cent

Akron, O., Factories Set New Record This Year with an Output of 11,522,650

AKRON, O., Nov. 17—More than 11,522,650 tires will mark the total production from Akron for 1916. Business for the year, gauged by the output of the past 11 months, will amount to \$203,100,000, an increase of 65 per cent over the preceding year. Some idea of the vastness of the industry may be had from the fact that 158,315 freight cars are necessary to carry the year's production to the various destinations. The city, which in 1910 had a population of only 69,000, now has 51,150 people employed in rubber manufacture. Floor space covering 88 acres and machinery costing more than \$2,500,000 have been added in 1916, and 12,005,000 square feet of floor space are now devoted to the rubber industry. The present capacity allows a daily output of 54,000 tires—19,837,750 for 12 months. This is approximately equal to existing demand, and it is a safe prediction to state that Akron will manufacture more than 20,000,000 tires in 1917.

Factories Work Full Capacity

Every factory is operating to full capacity, erecting still more buildings, planning on a greater increase of machinery and using every effort to meet the constantly growing demands. The B. F. Goodrich Co. has added 21 acres of floor space and hundreds of intricate and expensive machines to its plant, and at present is erecting new structures as quickly as men and materials can be secured. The company's total floor space exceeds 100 acres. The buildings border many of Akron's streets and are connected by a tunnel system more than 5 miles long. More than 20,000 men are employed in three 8-hour shifts. Business for this year, judged by a report of the first 8 months, will total \$77,000,000 as compared with \$55,416,000 in 1915. The daily capacity at the Goodrich plant is 20,000 tires.

The Goodyear Tire and Rubber Co. announces a total business of \$63,000,000 for this year as against \$37,000,000 in 1915, an increase of 85 per cent. They employ 15,000 men, occupy 75 acres of floor space and have a daily capacity of 17,000 tires. Factory additions totaling more than 30 acres have been made in the last year. The company manufactured 2,000,000 tires in 1915, approximately 3,500,000 for 1916, and plans to produce 6,000,000 next year.

The Firestone Tire and Rubber Co. has increased the number of men employed from 3,900 in 1915 to 8,000 in 1916, an excellent gauge of the growth of the institution. Factory additions total 11 acres for the last year and give the company 37 acres of floor space. Approximately sixty-five freight cars handle the daily

shipment. The factories are unique in construction, manufactured with brick, steel and glass, and consisting of 4 sections, each 700 feet long and five stories high, but practically under one roof. Business for 1916 amounts to \$33,250,000 as compared with \$25,000,000 in 1915. Machinery and other equipment, costing \$1,500,000 has been added and has increased the daily capacity to 12,500 tires.

The Miller Rubber Co., the Swinehart Tire and Rubber Co. and the General Rubber and Tire Co. have each had a remarkable growth. Additions of 24 acres of floor space have been added to the Miller plant, and the capacity has been increased from 1,000 to 3,000 tires a day. An eight-story building in process of erection will replace several old structures. When this is completed the concern will have approximately four times as much floor space as they occupied 10 months ago. The company manufactured 125,000 tires in 1915, and 300,000 in 1916; and it plans to produce 500,000 next year. The Swinehart Tire and Rubber Co. occupies 80,000 square feet of floor space and increased their business from \$1,250,000 in 1915 to \$1,500,000 in 1916. They employ 400 men and have a daily capacity for about 500 tires. The General Tire and Rubber Co. has added 35,000 square feet of floor space and more than doubled their business in the last year.

Material and History Affecting Pneumatic Tires

YOU frequently drive over the highways on a set of pneumatic tires. Occasionally you examine a casing or change an inner tube. It is quite likely that in so doing you give no thought to the rubber itself, to the trials and difficulties surrounding its collection, to the thousands of miles it travels to be made into the tire you accept as a matter of course, or to the toils of the men, who many years ago struggled with the unwieldy raw bulk in their efforts to convert it into useable material. It is a story of jungles, wild beasts, fever and famine, and of patient endeavor bulwarked by sound determination.

Rubber was first mentioned by Columbus who reported that natives of Haiti had great balls made from the gum of trees which would bounce to great heights. It was later found practical by Priestly, an English scientist, who discovered that the substance brought from the banks of the Amazon river in Brazil would remove pencil marks from paper. He gave the substance its name because he rubbed it over

the marks to erase them. However, the early explorers found little use for it. A few called it "black gold" and carried loads back to the continent but the majority hunted for genuine gold and other treasure.

Shortly after the American Revolution ships brought many rubber pouches and shoes of native make from South America to the New England coast. The Yankees looked upon them only as curios until Mackintosh, by haphazard experiment, discovered waterproof garments. He disliked the stickiness of the rubber with which he wanted to cover some cloth and accidentally laid the sticky sides of two pieces together and produced the rainproof coat so frequently used today.

Goodyear Discovered Vulcanization

Many years later Charles Goodyear, working in a mackintosh factory, began experiments with the curious material. He realized its shortcomings, found that the coats and other rubber articles were susceptible to heat and cold, were heavy and shapeless and lacked durability, and he attempted in many ways to overcome the weakness. His experiments were fruitless. He tried one plan and then another without success. One day he accidentally dropped sulphur and rubber on a stove and in removing it found that a chemical change had taken place. The heat and the combination had produced a rubber that was more pliable, more elastic, less sticky and easier to handle. More experiments proved the worth of the heat—and Goodyear thus discovered vulcanization, the operation of mixing rubber and sulphur and subjecting them to heat until cured.

Rubber today is secured in the greatest quantities from Brazil and the East Indies, the Hevea of Brazil and the Malay peninsula producing the best grades. The trees are tapped and give forth a milky secretion called latex which when dried is known as rubber. To reach the rubber trees along the Amazon the gatherer is forced to travel through tropical jungles, encountering every danger known to man. The climate caused by the alternating seasons of drought and rain is conducive to fever and the death rate among the natives is extremely high. In addition there is a constant hazard due to the number of wild beasts that live in the heavy shrubbery of the river banks.

Tapping methods in South America are usually found to be crude. In fact, many trees are damaged beyond further growth because of the system of tapping in use. Proper tapping, so far as is known, causes no harm to a tree either in shortening its life or in limiting its productive quantity.

ties. The South American usually makes an oblique upward incision with a sharp axe from which the gum flows slowly to a cup so placed to catch every drop. Some rubber tree cultivators in the Ceylon, experimenting with tapping methods, are using what is called the herring-bone method for tapping their trees and have found it very successful. It consists of a number of diagonal channels so cut that they meet one large vertical channel which takes the flow to the cup at the base of the tree. Other cups are so arranged on the tree that they catch every drop that escapes from the regular course.

Following the tapping, the cups are watched until full, when they are carried to a fire where the latex is poured on to a stick which is rotated by hand above the

heat. It soon becomes a hard mass in the shape of a ball weighing 30 pounds and is what is known in the rubber industry, as the biscuit.

When sufficient biscuits are gathered, they make an overland journey to the coast or river and are then loaded for shipment throughout the world.

Other rubber, in great quantities, is now

HUMPHREY NOW IN DETROIT

Detroit, Mich., Nov. 17—S. H. Humphrey, who resigned as vice-president in charge of production with the Chalmers company to become the vice-president in charge of manufacturing for the Briscoe Motor Corp., has resigned the latter position and returned to Detroit to engage in business for himself.

being secured from the Malay peninsula where the rubber, instead of growing wild, is cultivated on plantations much like fruit, or wheat, or cotton. The seeds were originally carried to Ceylon and the neighboring countries from Brazil and flourished successfully under the East Indian climate. The plantation rubber is not smoked over a fire like the Brazilian product but is acid cured and is usually shipped in sheets ready for use.

On arrival at the factories the biscuits are placed in vats of hot water which softens and prepares them for powerful machines used to crush the lumps so that they may be washed and made ready for mixture with compounds forced into the rubber by huge calenders, after which they are ready for use.

How Rubber Cement Is Made

Only Finest Quality of Para Used—Process Requires Much Care

By William K. Gibbs

IF SOME inquisitive member of your party were to ask you while you had stopped by the roadside to mend a punctured tube, how the rubber cement you used was made what would you say? Would you make the mistake so many make and without admitting that you did not know tell the inquirer that pieces of scrap and crude rubber were put in a vat of gasoline and permitted to dissolve until the mixture assumed the form of cement? If you did you would voice the same answer that has been advanced many times by those not familiar with the manufacture of rubber cement, and these are many.

Junk Rubber Not Used

Really, you never gave the subject much thought, did you? Perhaps you may have thought it too sticky to handle and let it go at that. You know when you have cleaned the surface surrounding the cut or puncture in an inner tube and gone through the same performance with the patch and applied rubber cement to both the patch and tube that if the cement is good the patch stays in place indefinitely and virtually becomes a part of the tube itself.

The writer made a visit to the factory of Van Cleef Bros., Chicago, makers of Dutch Brand cements and other sundries, to learn just what process is involved in the making of the quality of rubber cement that is used to repair inner tubes of motor cars. It is assumed that a recapitulation of the steps necessary to give you a tube of cement for your repair kit will be interesting to many persons for this is a subject on which there is very little common knowledge. We may use it in our everyday driving, but like the different kinds of food we eat, we seldom give much thought to its origin.

The idea that the rubber accumulation

from junk wagons is the basic material for producing rubber cement is erroneous. It is necessary that only the very highest grade of Para rubber be used, as discarded scraps of previously used rubber does not make for adhesive qualities in rubber cement. Quite frequently you may apply a patch to your tube and find that it does not hold; that the cement seems to powder when put under pressure and strain. This is very likely due to the use of junk rubber by unscrupulous manufacturers.

Van Cleef Bros. get their Upriver Maderia Para from Brazilian plantations and their brokers are acquainted with the exact grades of rubber required. In its original form, as it comes from the plantations, the rubber is in balls, or biscuit-shaped masses, usually called rubber hams. These hams are soaked in vats to remove the exterior dirt and foreign matter, then cut into pieces ranging up to the size of the hand.

Next these smaller pieces are put through a semi-macerating process. The machine that does this work is a series of rollers surmounted by a hopper through which the pieces of crude are fed to the machine, a stream of water playing down over the rollers. This macerating process is called breaking down the rubber. Much of the foreign substance that was not taken out by the first washing is removed in this process. After the rubber has come from the series of rollers in the breaking down process it takes the form of crepe paper, only the edges of the sheets of crushed rubber are very irregular. These sheets vary in size, some of them being about like an ordinary table cloth.

Another washing and then comes the drying process. These thin sheets of rub-

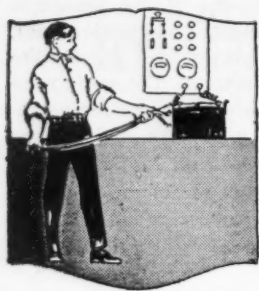
ber that still have a crepe paper appearance are hung in specially prepared drying rooms where they remain under an even temperature for at least 2 months. The longer the rubber dries and cures the better the adhesive qualities of the cement it makes. The drying room is permeated by an odor that is very much like that of dried beef, which is given off by the rubber. These sheets of rubber are very thin and somewhat brownish in color.

Must Be Chemically Correct

Chemically the making of rubber cement is a very particular job. Great care must be taken to give the cement the right consistency and proper adhesive powers. Four chemicals are used in the dissolving of these sheets of dried rubber, the principal one among these being benzol. Making rubber cement is much like the work of a blast furnace—once a mixture is in the drums where it is stirred and dissolved it must be given constant care and the Van Cleef factory works night and day.

After the cement has been made it is put in tubes and cans. The tubes are filled from the bottom and the machine which does this crimps the tin together and seals the tube. Compressed air is used to force the cement into the tubes and the machine used for the filling has a capacity of 1,600 tubes an hour. Next the tubes are labeled and packed, ultimately finding their way into your repair kit.

Cements used for inner tubes are quite different in character from those used in the manufacture of shoes, raincoats, millinery and other kinds of merchandise, yet in certain respects they are alike as to their basic principles. It is important that rubber cement be not too rich in resin. While much resin makes cement very sticky in appearance it powders after a short time.



Electrical Equipment of the Motor Car

By David Penn-Moreton & Darwin S. Hatch.



Editor's Note—Herewith is presented the twenty-second installment of a weekly series of articles which began in *Motor Age* issue of June 29, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the Class Journal Co., Chicago, in a size to fit the pocket conveniently. It is expected that the book will be published about May 1.

WHAT HAS GONE BEFORE

The fundamentals of electrical circuits of the motor car were explained through their analogy to water systems and the relations of current pressure and resistance brought out. This was followed by an explanation of series and multiple circuits, and how electricity is made to do work in lighting, starting, signalling, etc. Calculating the capacity of a battery for starting and lighting and the cost of charging storage batteries and determining the torque a starting motor must develop were explained. Action of primary batteries and dry cells was taken up and the best methods of connections. A separate section was devoted to the makeup and action of lead and Edison storage batteries, and another to the care of lead batteries in service and best methods of charging them. Magnets and electro-magnetism then were considered and the principles of generators and motors explained. A section on generator output was followed by one on the purpose and operation of the cutout.

Part XXII—Electromagnetic Regulation

Energizing the Bucking Coil Intermittently by Means of a Magnetic Vibrator: A system of regulation, that is very seldom encountered, makes use of a vibrating magnet, similar to those previously described, in combination with a bucking coil. The principle of operation of such a system can be easily understood by reference to Fig. 150. The resistance R in Fig. 14⁶ has been replaced by an additional field winding, which carries a current when the contact C is open. The direction of the current in the bucking coil is such as to produce a magnetizing effect in the opposite

direction to that produced by the current in the main or shunt field winding. Some systems have made use of the bucking coil in parallel with the resistance, and only a part of the shunt field current passes through the bucking coil.

Electromagnet Used in Combination with a Carbon Field Resistance: The carbon used in the construction of field resistances is in two forms. One form consists of a large number of small carbon discs piled on top of each other and normally held together tightly under the tension of a spring, so that their resistance is quite low. The armature of the regulator is attached to the spring so the magnetic pull on the armature lessens the tension of the spring holding the carbon discs together and the resistance of the combination is increased, due to the fact that the various discs are making poorer contact with each other than they were when the tension of the spring holding them together was at its maximum value. The magnetic pull on the armature of the electromagnet will depend on the value of the current in the winding, which may be arranged to vary as the current from the generator by connecting the winding in series with the generator, or as the voltage of the generator by connecting the winding to the terminals of the generator. In the first case the winding will consist of a small number of turns of large wire, while in the second case the winding will consist of a relatively large number of turns of small wire. Carbon resistances composed of discs have been used in some models of the U. S. L. and Apleco equipment.

The other form of carbon in the construction of field resistances is the finely divided, or powdered, carbon in combination with small flakes of mica. This mixture of carbon and mica is carried in a suitable cup, or cylinder, and is compressed by a plunger which normally is held against the mixture under the action of a spring. The action of the spring is counteracted to varying degrees by the magnetic pull of an electromagnet, and the pressure of the plunger against the mixture of carbon is varied. The small particles of mica give to the mixture a springiness which causes the particles of carbon to separate to a certain extent when the pressure is reduced and as a result increases the resistance of the mixture. A good example of this type of carbon resistance is found in the voltage regulator of the Bosch company.

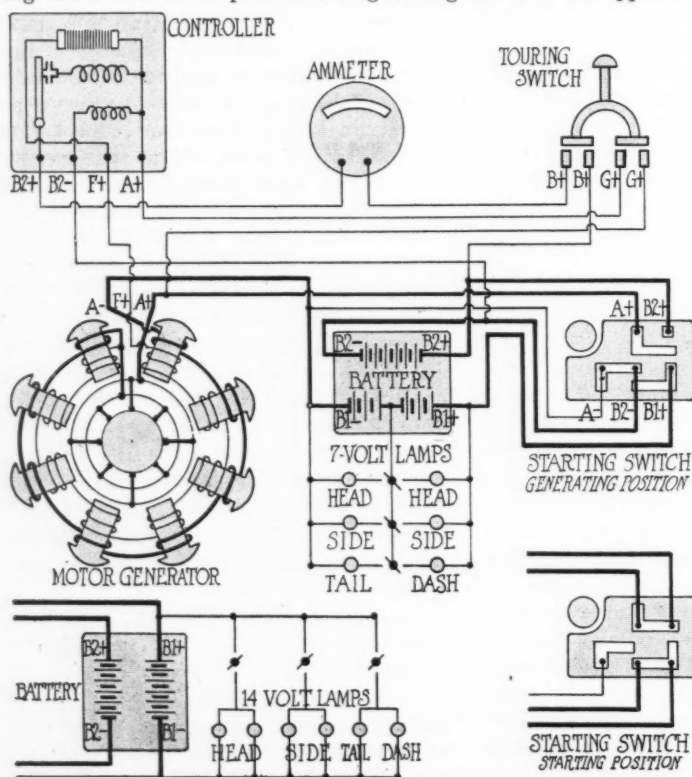


Fig. 151—This wiring diagram shows the connections of the U. S. L. regulator and cutout. The field resistance is in the carbon disc form.

The operation of the U. S. L. regulator that has the carbon-disc resistance may be understood readily by reference to Fig. 151, which gives a wiring diagram of the connections. In this system two storage batteries are used. They are charged in parallel and discharged in series through the starting motor, the change in connections being made by the starting switch. The connections in the starting switch for both the generating and starting positions are shown. The circuits through the regulator may be traced as follows: Starting with the generator terminal marked A+, which corresponds to the positive set of brushes, go to the contact G+ of the touring switch and then to the terminal A+ on the controller. From the terminal A+ on the controller you may return to the negative set of brushes on the generator by two circuits. One of these circuits is from A+ on the controller through the lower coil, called the shunt winding in this case, to the terminal B2-; thence to the terminal B2- on the starting switch; thence from A- on the starting switch to A- on the generator; thence through the series winding on the fields to the negative set of brushes, and then through the armature winding back to the starting point, or generator terminal A+. The second circuit between the terminal A+ on the controller and the negative set of brushes on the generator is through the carbon resistance indicated at the top of the regulator to the terminal F+; thence through the shunt field winding to the junction of the shunt and series field windings, which corresponds to the negative set of brushes on the generator; and then through the armature winding back to the starting point, or generator terminal A+.

As the voltage of the generator builds up, due to increase in speed and field strength, the current in the shunt winding on the controller, which is connected between the terminals A+ and B2-, increases in value. When the magnetic pull due to the current in the shunt winding reaches a certain value, an armature of the electromagnet is drawn over and the contacts between the terminals A+ and B2+ on the controller are closed. The closing of these contacts completes a circuit between the positive and negative terminals of the generator through the batteries. This circuit may be traced as follows: From A+ on the generator through the contacts G+ on the touring switch to the terminal A+ on the controller; thence through the series winding and contacts to the terminal B2+ on the controller; thence through the ammeter to the contacts B+ on the touring switch.

From the right-hand contact, marked B+, on the touring switch, the circuit divides, one going directly to the terminal B2+ of the upper battery through the battery to the terminal B2-, and then to the negative terminal of the generator. The second circuit goes to B2+ on the starting switch; thence to B1+ on starting switch; thence to the terminal B1+ of the lower bat-

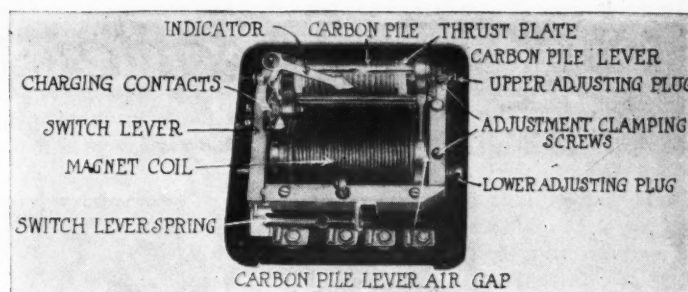


Fig. 152—The cover of the U. S. L. regulator and cutout has been removed, and the more important parts are marked. The indicator acts as a barometer for the cutout

tery through the battery to the terminal B1-, and thence to the negative terminal of the generator. When the above connections are made the generator is charging the two batteries in parallel and the ammeter is indicating the sum of the currents in the two batteries, assuming no lights are turned on. The current in the series coil of the controller is the same as that indicated by the ammeter. When the current in this series coil exceeds a certain value the magnetic action of the current causes sufficient pull on an armature to partially overcome the action of the adjusting spring, and the force holding the carbon discs together is reduced, causing an increase in the resistance they offer. Hence, the value of the field current and the value of the voltage generated will decrease. A description of the operation of the remainder of this system will be given later. The complete controller with the cover removed is shown in Fig. 152, and the more important parts are marked. The indicator gives a visible indication as to whether the cutout is operating or not, the end of the pointer showing through a small hole in the top of the cover.

Electromagnet Used in Opening the Field Circuit of the Generator: The Apleco systems make use of an electromagnet whose winding is connected directly to the terminals of the battery. The armature of this electromagnet controls a set of contacts which normally are closed and connected in series with the field winding of the generator. When the voltage of the battery has reached a value ample to produce current in the winding of the electromagnet so that the magnetic pull on the armature overcomes the tension on the adjusting spring, the contacts open and the current in the field winding is reduced to zero value. This is neglecting the effect of residual magnetism. The battery will not be charged until its voltage drops to a certain value, depending on the adjustment of the spring controlling the armature on which the contacts are mounted. This will allow the contacts in the field circuit to close again.

NEXT WEEK

The next installment of the series on the Electrical Equipment of the Motor Car will continue the consideration of the electromagnetic regulation, taking up the use of a solenoid to control the value of the field resistance.

SPECIAL ELECTRIC LIGHTING AND STARTING ISSUE

Motor Age for Nov. 30 will be featured by special articles on recent developments in electric lighting and starting apparatus and the owner's care of these systems in the new cars.



The Readers' Clearing House

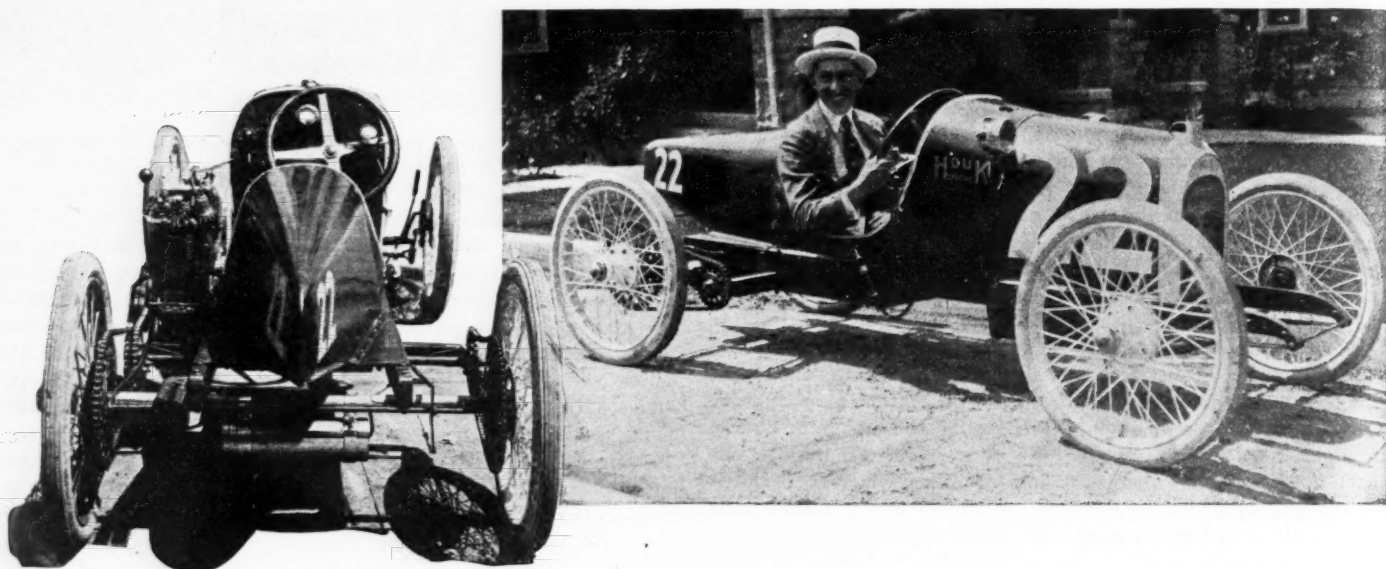


Fig. 1—Miniature racing car used by Harry Hartz, which is equipped with 61-cubic inch displacement motorcycle motor driving the rear axle through chains

MINIATURE RACING CAR DESCRIBED Harry Hartz' Small Size Speeder Described and Pictured

IDNEY, Ia.—Editor Motor Age—Describe and illustrate one of the miniature racing cars which raced at San Francisco in the Junior race held this year.—H. P. Champ.

The car of Harry Hartz, master junior driver, is shown, side view and front view, in Fig. 1. The car is very simple in its mechanical construction.

There is a 7-horsepower motorcycle motor suspended on the side of the frame, as shown in the rear view. On the side of the motor is a clutch operated by the lever, which may be seen projecting over the top of the motor. The motor, from a small sprocket to a larger one, drives the countershaft, which may be seen a short distance ahead of the rear axle. This countershaft in turn, through two small sprockets chained to two larger sprockets, drives the rear axle. The motor to rear axle speed reduction is brought about through these different sprocket sizes.

Fuel is carried within the body of the car. The method of braking is plainly visible in the illustration. The hand lever on the right side turns the small rod back of the rear axle which manipulates the brakes within the sprocket drums. The car pictured has a 61-cubic-inch piston displacement and weighs 350 pounds.

HUDSON TRANSCONTINENTAL DOPE Gear Ratio Given—Information Concerning Work Done on Car

Madison, S. D.—Editor Motor Age—What is the gear ratio of the Hudson Super-Six which broke the transcontinental record twice?

2—How long after its arrival in New York did it start back to San Francisco?

3—What repairs were necessary at either end?

4—What is the gear ratio of the Hudson that won the Pike's Peak climb?—H. H. Frudenfeld.

1—The gear ratio used was 4 5/11 to 1 with 35 by 5-inch tires. The Hudson Motor Car Co. uses several gear ratios, but this may be considered the most popular one.

2—The car arrived in New York at 6:32 a. m. and it was planned to leave at noon. Owing to extremely bad weather, the start back was postponed.

3—Of the actual work done on the car there is no detailed record. However, the following items, according to the factory, cover it quite thoroughly:

Changed wheels and tires, fitted new right-hand front-wheel bearing, removed cylinder head and cleaned out carbon, cleaned out oil reservoir and refilled with fresh oil, tightened body bolts and put in new shims between body and frame, welded

rear gasoline-tank bracket where it had been bent by some obstruction and cracked.

In addition to these the car was thoroughly examined for nuts or bolts which might have been loosened during the strain, and there is no question but that they must have found quite a number to tighten up. The car was thoroughly washed and mechanical parts cleaned so that they might better be examined, and the grease cups were all refilled and the car oiled all over. Except for the front-wheel bearing and the tires, there were no replacements made. The car was ready for the start back at the appointed time, and it was only due to weather conditions that it was delayed.

On its arrival in San Francisco it was in good condition except for a broken front spring and general wear and tear. Owing to the severity of the last 300 miles of the journey, which was made through a raging storm, the car was plastered with mud. The brakes were, of course, worn out and the sand and mud got into everything. The radiator was completely choked, and it is questionable whether the car would have been able to go very much farther in this condition.

4—The Hudson Super-Six Special was equipped with 4.9 to 1 rear axle, which is the lowest gear ratio the Hudson company supplies. It used 33 by 4 1/2 tires on the rear and 32 by 4 1/2 on the front.

WHAT FORKED CONNECTING ROD IS Two Bearings of One Member Surround One of Opposing Part

Detroit, Mich.—Editor Motor Age—As I understand it, a forked connecting rod is one in which the opposing rods of a V-type motor are cast together. Am I correct?

2—At what angle must the cylinder be set



Fig. 2—To show forked connecting-rod construction and bearing location in V-motor

in order to use this forked connecting rod?

3—At what point does one of these rods meet the other?

4—Is any difference made in the bearing space when using this type of rod?—A. Reader.

1—No. It is quite impossible for the opposing rods in a V-type motor to be cast together. A forked connecting rod construction is one in which one rod is forked at the lower end and surrounds, with two bearings, the one bearing of the opposing rod. The construction is shown in Fig. 2.

2—At 90 degrees in an eight-cylinder motor, at 60 degrees in a twelve.

3—The bottom of one rod surrounds the bottom of the other, as shown in the sketch.

4—Not in the amount of bearing surface. The two fork bearings have the same surface as the one solid one.

BATTERY AND GENERATOR VOLTAGE Difference in 12 and 6 Volts May Be Compensated in Connections

Hooker, Okla.—Editor Motor Age—Explain how to wire the lights on a 12-volt battery to make a 6-volt light. I have a Genemotor on a Ford car with an U. S. L. 12-volt battery.—H. T. Beatty.

The diagram shown in Fig. 3 shows a method of wiring head lights, side lights, tail light and ammeter with a 6-volt generator and 12-volt battery. The dotted lines show the charging wire from the generator, which should be connected, first with one side of the storage battery and then the other, the change being made about once a week. This will give a 6-volt battery connection and will permit charging into both sets of cells.

TIRE SIZE EFFECT ON MILEAGE Speedometer Reading Will Vary 31.2 Miles Per 1,000 Miles

Jordan, Minn.—Editor Motor Age—I have a car, fitted with a speedometer, which has 34x4-inch tires. I changed the tires to 35x4½-inch but did not change the sprocket wheel of the speedometer. What will my record show short per thousand miles with this arrangement?—C. H. Casey.

A 34-inch tire revolves 593.2 times per mile; a 35-inch tire revolves 576.2 times per mile. Thus, to determine the reading on the speedometer we have an equation as follows:

$$\begin{array}{r} X \quad 593.2 \\ \hline 1,000 \quad 576.2 \end{array}$$

Solving the equation we have X equal to 1,031.2 which is the number of miles your car has traveled when the present speedometer attachment registers 1,000 miles. In other words, there is a difference of 31.2 miles per 1,000 miles in the reading.

CAR SPEEDS FOR GEAR CHANGING Safest Way to Slacken Momentum When Descending Hill

Chicago—Editor Motor Age—In shifting gears from low to second and from second to high on a D-45, 1917 Buick, what should be the approximate speed the car should travel, as when the gears are shifted in most cases they seem to grind.

2—In descending a hill when the car is in high, what is the safest way to slacken the speed should the car be going too fast?

3—Kindly give the name of a good polish for motor cars.—G. A. Melms.

1—The grinding of the gears is probably not due to the speed at which you make

the change from one gear to another, but rather that you do not have the proper relation between the motor speed and drive shaft speed. When shifting from low to second, speed up the car to about 5 miles per hour, remove the foot from the accelerator and make the change quickly. Then speed up to 8 or 10 miles per hour and change into high, removing the foot from the accelerator also in this operation. The thing to remember is that the motor and drive shaft should be turning at very near the same speed when the change is made to high gear to avoid grinding of the gears and the only way these relations can be gained is to let the motor idle down when progressing from one gear to another.

2—If the hill is not too long and too steep, release the clutch and apply the brakes—not vigorously enough to slide the wheels, but just enough to retard the speed of the car. In unusual cases where a very long, steep descent is encountered, leave the clutch in and shut off the ignition. The motor will then help to brake. Do not

Communications Received and Inquiries Answered

H. P. Champ.....	Sidney, Ia.
A. Reader.....	Detroit, Mich.
H. H. Prudenfeld.....	Madison, S. D.
H. T. Beatty.....	Hooker, Okla.
C. H. Casey.....	Jordan, Minn.
G. A. Melms.....	Chicago
A. B. Doyle.....	Winslow, Ariz.
G. W. Kimmel.....	Pittsburg, Kan.
H. H. Edwards.....	Havana, Ill.
Charles Thomas.....	Greenburg, Kan.
J. S. Amsden.....	Deadwood, S. D.
D. H. Schlachter.....	Beatrice, Neb.
J. Edgar Finn.....	Brooklyn, N. Y.
X. Y. Z.....	Mt. Carroll, Ill.
Frank H. White.....	Cleveland, O.
L. L. Switzer.....	Vicksburg, Miss.
B. P. Field.....	Lawton, Okla.
Charles G. Robers.....	Crystall Falls, Mich.
J. A. Stransky.....	Pukwana, S. D.
John B. Tenolio.....	Manett, Mo.

No communication not signed by the inquirer's full name and address will be answered in this department.

use the brakes with the clutch engaged unless you find it absolutely necessary.

3—Polish makers who have advertised consistently for a good number of months have something good. If their products did not have merit sales would drop off and there would be no resources to pay

for the advertising. We can recommend no particular make of body polish.

Ammeter on Hupmobile

Winslow, Ariz.—Editor Motor Age—I want to connect up an ammeter on my 1915 model K Hupmobile. Kindly advise how this should be done.—A. B. Doyle.

It is not advised that an ammeter be installed on this car inasmuch as it is equipped with a single unit starting and lighting system. Consequently, in order to install an ammeter it is necessary that the instrument show a reading high enough to show the high amperage which is taken from the battery at the time the starting motor operates, which may run at times as high as 225 to 250 amperes. The ammeter would have to be one of large capacity to stand such a strain.

Radiator for Buick Model 10

Pittsburg, Kan.—Editor Motor Age—Does Motor Age know of any firms making a specialty of manufacturing radiators which are high, so that it would give the car a high front, one that can be put on a model 10 Buick, somewhat like the Champion radiators used by the Ford cars in the Chicago race. I am building a speed car body and would appreciate any information you could give along this line as to up-to-date racing bodies.—G. W. Kimmel.

Motor Age knows of no concern making a radiator of the description you give to be applied to a Buick model 10. You could undoubtedly get a special job made up by almost any radiator manufacturer if you were willing to go to that expense. Have you tried the champion makers? They might make up a special body and radiator for your car.

Hudson Bearing Makers

Greensburg, Kan.—Editor Motor Age—Does the balanced crankshaft alone in the Hudson Super-Six give it the extra power over the older Hudson six?

2—Kindly give the name and address of the manufacturer of the bearings used in this car.

3—Is the rear axle full-floating or three-quarters floating?—Charles Thomas.

1—The major portion of the power increase is attributed to the new crankshaft; however, the motor has been materially refined in several minor details.

2—Timken Roller Bearing Co., Canton, O.

3—Three-quarter floating.

Propeller on Motor Sled

Deadwood, S. D.—Editor Motor Age—I would like some information regarding motor sleds. What size and pitch should the propeller be to

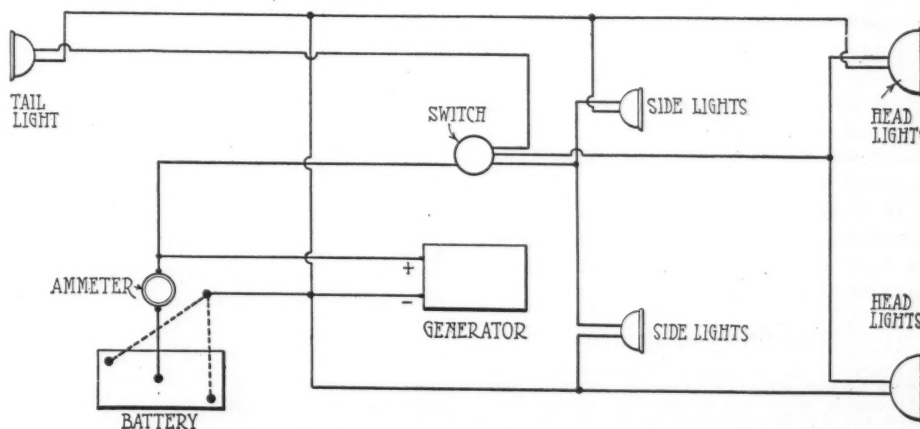


Fig. 3—Showing method of connecting 6-volt generator with 12-volt battery. Dotted lines show wire which must be switched weekly

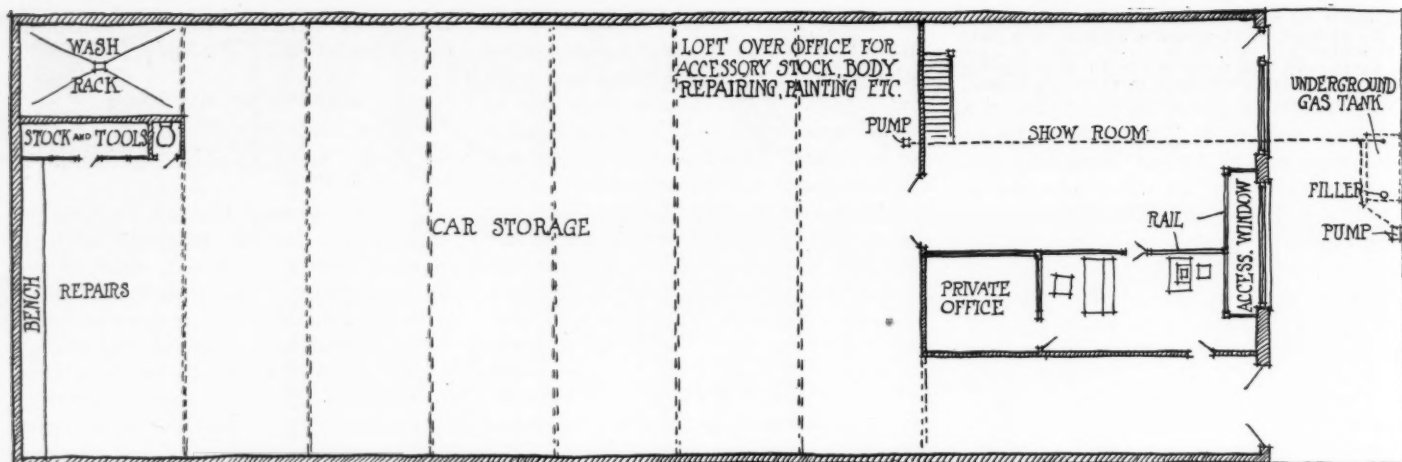


Fig. 4—Layout for 60 by 140-foot one-story garage, with loft for storage of tires and bulky accessories. There is a liberal display window provided for in front

be driven by an ordinary 5-horsepower motor-cycle engine?

2—About what should the gear ratio be?

3—Would a low gear be any advantage on a hill?

4—Can I expect good hill-climbing ability, provided the sled is light, weighing no more than a motorcycle, and the road surface in good condition for runners?—J. S. Amsden.

1—It is a matter of experimentation to find what size would give the best results. A 4-foot propeller with about a 4-inch pitch should be very nearly right.

2—The propeller should turn at motor speed.

3—No. The motor will drive the propeller whether the car is standing still or moving.

4—You cannot expect such a device to climb much of a grade. Probably 5 per cent would be the maximum.

WANTS HEAT-TREATING PROCESS Front Axle Cannot be Properly Tempered Without Special Equipment

Beatrice, Neb.—Editor Motor Age—Give the process of heat treating front axles as the one on my Velle car has been sprung several times, and the temper seems to be gone, and is now soft and bends very easily.—D. H. Schlachter.

You do not state what model Velle you have, therefore we cannot determine exactly what alloy the axle is constructed of and cannot give you an accurate heat-treatment formula.

Moreover we do not consider that a heat-treatment formula would do you any particular good unless you have access to a heat-treating oven with accurate thermometer equipment.

Heat treating of alloy steels requires a temperature between 1,400 and 1,750 degrees Fahrenheit, depending on the kind of metal. For successful treating, the temperature must be brought to within 50 degrees of the specified figure.

It is easy to understand that no such operation could be performed in a forge; in fact, anywhere but in a well-equipped heat-treating oven.

Heat Direct to Manifold

Pukwana, S. D.—Editor Motor Age—Would it be feasible or practicable, in order to more thoroughly vaporize a mixture of one-half kerosene and one-half gasoline, to top the exhaust pipe right above the carburetor with a steel ball valve and convey the hot air to the manifold by brass tubing?

2—Would there be any danger of fire or premature explosion caused by the hot air from the exhaust pipe?—J. A. Stransky.

1—Yes, if you do not get too much heat.

2—No. Of course, you do not proopse the use of exhaust gas. We consider that your idea is to pipe from a stove on the exhaust pipe. If the temperature of the air is reasonably low, which it would be if the air was drawn from a stove, there should be no great danger from backfiring.

LEAD IN FLYWHEEL OF FORD MOTOR Increase in Weight Will Not Assist Engine Speed

Cleveland, O.—Editor Motor Age—I am reconstructing a 1912 Ford into a racing car and would appreciate the following information:

1—What should the difference in size, of cylinder and Lynite piston be to prevent sticking at high speed? Should this be .005?

2—I would like to make the flywheel heavier. Would it be advisable to remove the magnet and refill with lead? If so, what would you advise?

3—What should be the weight of the connecting rod and piston with a heavier flywheel?

4—Give a diagram of the oiling system you would advise.

5—Also, explain the method of undersliding the Ford.

6—Would it be advisable to mount the water pump on the left side of the engine, using the fan belt and pulley to drive same, or is the cooling system sufficient for high speed work?—Frank H. White.

1—The alloy piston should have a clearance between .003 and .005 inches greater than the cast iron piston.

2—Why do you wish to make the flywheel heavier? Flywheels are for balance rather than speed. You might remove the magnets to save the drag they create, but we see no advantage in inserting lead in place of them.

3—Leave the connecting rod alone. The aluminum piston should weigh in the neighborhood of 13 ounces.

4—We can advise no special oiling system. The Ford system will take care of the motor satisfactorily at high speeds. The only thing we could suggest would be a hand pump which would feed oil to the crankcase from a separate tank should more oil be found necessary.

5—Methods of undersliding Ford will be taken up in next week's issue.

6—A water pump, if properly installed, would materially assist cooling, and, if the Chicago Ford amateur race proves anything, more than the standard cooling ca-

capacity is necessary for sustained high speed. In most instances, in this race, cooling was taken care of by a special radiator or a Ford radiator with an extra tank soldered on.

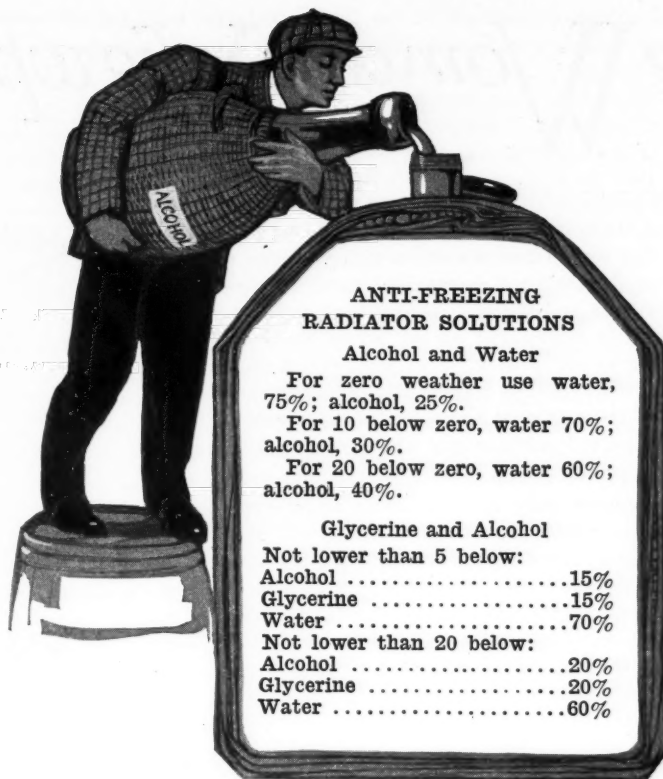
SPEED VALUE OF ALUMINUM PISTON Not Advisable to Fasten on Plates to Increase Compression

Mt. Carmel, Ill.—Editor Motor Age—I propose to substitute aluminum pistons, lighten connecting rods for higher speed and more gas economy. Should plates be fastened to pistons to lessen compression space? If so, how thick, size 4-inch bore and 5-inch stroke? Would setting valves ahead one tooth on the gear be advisable on the intake and exhaust camshaft? Should the carburetor be adjusted for less air? I propose using a smaller pinion on the final drive. Would it be necessary to increase the tension on the valve springs? The motor is T-head 4x5, valves 1 1/4 opening. How should the magneto be timed for the increase of speed? Can bronze be used successfully in pistons? Do many of the higher grade cars now use aluminum for pistons and connecting rods? Are they entirely successful as to wearing qualities?—X. Y. Z.

Do not try to fasten plates to the pistons. If you are going to insert new ones have them constructed with a thicker head if you want less combustion space. However, if you will fit non-leaking rings to the new pistons, we see no reason why you should need to reduce the combustion space. Remember that reducing the combustion space is much the same as decreasing the stroke. Setting the valves ahead one tooth might help increase the speed. The carburetor needs more air at high speeds, not less. Why use a smaller pinion on the final drive? If you want to increase the speed of the car you should use a larger pinion, if the same size ring gear is to be used. Of course both gears will have to be new. Increasing the valve spring tension would increase the speed. This may be done by inserting washers over the valve-spring retaining washer. Set the magneto one or two teeth ahead, that is so that the points for a certain cylinder will brake slightly earlier in the motor's rotation. This is a matter to be experimented with, seeing what setting will give the best results.

Bronze is not a good piston material. Light weight is a factor and bronze is heavier than iron. Aluminum alloys are

WATCH! YOUR RADIATOR COLD



best for speed as is evident by the universal use of this material in racing car engines.

Several high-grade cars are using aluminum pistons and they are entirely successful as to wearing qualities.

CADILLAC TRANSCONTINENT TIME Correct Figures on Elapsed and Actual Running Times

On page 40 of the October 19 issue of Motor Age in the answer the Reader, Goldsboro, N. C., questions were answered incorrectly regarding the transcontinental Cadillac run. The record was 11 days, 7 hours and 15 minutes, which was the elapsed, instead of the actual running time, as stated. The Cadillac left Los Angeles at 12:01 a. m. Monday, May 8, arriving at Times Square, New York, Monday, May 15, at 2:53 p. m. In computing the elapsed time, 3 hours are of course allowed for the difference in time.

The Cadillac had but one driver, E. G. Baker. He was accompanied by W. F. Sturm, of the Indianapolis News, but the latter did none of the driving. The actual running time was 128 hours. The time not running, when the driver slept, ate, etc., was 51 hours and 52 minutes.

ADDED INFORMATION ON COLE 8 Reader Furnishes Advice for Alexandria, Minn., Inquirer

Brooklyn, N. Y.—Editor Motor Age—On page 32 of the Readers' Clearing House department of the August 24 issue of Motor Age a few questions are asked by a subscriber from Alexandria, Minn., with regard to the Cole 850, eight-cylinder motor car.

Understanding the car thoroughly, the

following suggestion may help this gentleman in the future.

Answering question No. 3—The distributor of the Cole-eight motor is located on the silent chain housing. This will be found after removing the distributor cover, then the rotor that the rotor shaft is exposed. This shaft performs two functions, it operates the breaker and distributes the high-tension current.

On the center of this shaft will be found a small set screw. Examine and tighten set screw if possible whenever going over the car or motor as this is for the purpose of changing the ignition time, or, in other words, changing the position of the rotor shaft in relation to the crankshaft and often loosens from vibration and road shocks. No doubt this screw working loose was the cause of the motor being out of time.—J. Edgar Finn.

WANTS ROADSTER ON OAKLAND 62

Vicksburg, Miss.—Editor Motor Age—I have an Oakland 6-62 chassis out of which I would like to make a runabout, but do not want to spend much money on it. Kindly give some information in regard to remodeling this without going to too much expense.—L. L. Switzer.

Oakland never produced a roadster body for this model and so, of course, you cannot obtain one without having it special built. A special body would mean a considerable money outlay. As the body is a metal one, it would be quite difficult to remove the rear seat and make a good looking job of it.

About the only alternative would be to strip the car; that is, remove the body and insert in its place a pair of bucket seats built low onto the frame. This would give considerable space behind the seat, which could be used for gasoline and oil tanks or a tire carrier or trunk.

A good looking job with this modifica-

tion would run you into an expense of \$100 or \$200, or if you had all of the work done by someone other than yourself would probably go well above that figure.

1—The National six has a bore of $3\frac{1}{2}$ inches and stroke of $5\frac{1}{4}$.

2—The high gear ratio is 4.58 to 1, with 12 teeth in the pinion and 55 in the ring gear. There are no official records of the speed.

3—The motor is a product of National's own shops. In accordance with Motor Age's policy, no figure is given on r.p.m.

4—The 1917 Chandler has a bore and stroke of $3\frac{3}{8}$ by 5. The gear ratio is 4.4 to 1. There is no official record of the speed. The Chandler motor is manufactured in the Chandler factory.

HOW TO GRADUATE MEASURE STICK Figures Given for Division of Tank Into Ten Parts

Crystal Falls, Mich.—Editor Motor Age—Kindly advise me how to graduate a measuring stick for a gasoline tank of 225 gallon capacity, which is 40 inches in diameter by 42 inches in length, which lies flat on its side.—Charles G. Rogers.

Mark off 40 inches on a measuring stick. Then divide this into ten equal parts which, of course, will mean that each division is 4 inches apart. The first mark will be $\frac{1}{10}$ full, the second $\frac{2}{10}$, the third $\frac{3}{10}$, etc. The following table will result:

Full	.....	Total capacity or 250 gal.
9/10 full	.....	.946 of capacity or 236.5 gal.
4/5 full	.....	.850 of capacity or 212.5 gal.
7/10 full	.....	.748 of capacity or 187 gal.
3/5 full	.....	.626 of capacity or 156.5 gal.
1/2 full	.....	.500 of capacity or 125 gal.
2/5 full	.....	.374 of capacity or 93.5 gal.
3/10 full	.....	.252 of capacity or 63 gal.
1/5 full	.....	.140 of capacity or 35 gal.
1/10 full	.....	.052 of capacity or 13 gal.

DIAGRAM FOR GARAGE 50 BY 140 Layout Given to Assist in Interior Construction—One Story Planned

Lawton, Okla.—Editor Motor Age—Publish a diagram of a 50x140-foot garage, in which I expect to sell motor cars and accessories, with a gasoline tank on the curb.—B. P. Fields.

Although you do not specify whether you intend to build a one or two-story garage or whether there is an alley in the rear or a street on either side, we are illustrating a plan in Fig. 4 which may assist you in the interior layout. You will note that there are no side windows provided for.

There is an accessory window in the front accessible both to the office and display room. The latter is plenty large for three or four cars.

There is no reason why the same gasoline tank cannot be utilized for an outside and inside filling pump, connected in the manner shown. A loft is suggested to be located over the office and show room in which may be stored the tire stock and the bulk of the larger accessories.

More Power in Coal Oil

Lewisville, Ark.—Editor Motor Age—Which has the most pulling power in a stationary engine, gasoline or coal oil, and why?—Ray H. Holland.

Coal oil; because there are more heat units in this fuel than in gasoline. The heavier fuel among petroleum products the greater the heat value.



From the Woman's Viewpoint



NOVEMBER has brought the opera season. To one this means the season for drama set to music. To another it means the season for the resurrection of the fish and soup. To still another it means the closed season for the sunburn and tan and the open season for fragile garments. To this one it means the season when the closed cars appear in greatest throng. To that one it means the season when the taxi is a heated taxi. While to some it means all these things: Fragile garments, soup and fish, closed car, heated interior and drama set to music.

For after all the drama set to music cannot exist alone. Though this also may be a consummation devoutly to be wished—to live alone on opera—the world as a whole is a cold and skeptical universe, and it demands a descent to the utilitarian basis sometimes. And so, memories of opera nights are apt to recall also reveries of delicate fabrics, dark-clad, shadowy figures, all melting into a long trail of motor cars that come and go before the canopied entrance.

What They Wore to the Theater

They all were there—dowager limousine, flapper sedan, athletic touring-car, smug Berline, sedate brougham, friendly coupe, distant landaulet and dashing roadster. Mrs. Dowager Limousine, concerning whom no other note is necessary, had as her guests in her parking section of the boulevard adjacent to the stage Miss Debutante Sedan, whose family rapidly is gaining popularity in society; Athlete Touring-Car, one of that family who "does things"; Smug Berline, a prosperous banker, you know; and Sedate Brougham, man about town and that successful social sponsor so much in demand for worthwhile entertainments.

Mrs. Limousine wore a gown of the new green that is so like the peacock's general color scheme. Miss Sedan was gowned in maize colored whipcord, and she wore a platinum toned nickel band about her radiator. The men, as usual, furnished the conventional darkness of the evening.

Within the theater, and by no means in so desirable a location, owing to the inferior ventilation, glaring lights, close confinement, etc., were their companions, the Music-Lovers. But in spite of the fact that the Music-Lovers had been able to obtain seats more advantageous for sight-seeing at the opera, their attire and general elegance by no means overshadowed Mrs. Limousine and her guests.

The New Colors Are Adopted

The Music-Lovers could not view the newest comers to opera society as those in this select parking section could. And Mrs. Dowager Limousine thought, as she trained her lorgnette on the fair gathering of the latest models, that more than ever before were to be seen the dowagers of motor life wearing colors that heretofore had been allotted to the more frivolous of the city. Practically no black shades were to be seen. Even the conservative Mr. Touring-Car wore a maroon evening suit, which beneath the lights of the boulevard gave back just the right lightness of reflection. True, Mr. Brougham retained the conventional black of the old days, but a mustard velvet robe with lining of sapphire blue panne



Fur may be king this season, but some motoring coats appear never to miss his absence. For instance, this coat seems perfectly satisfied to be an exception to the royal rule. Furry warmth of rabbit, seal or whatnot is gone, yet note the new features



Its lines of white novelty stitching and the arrangement of the folds to hold the belt in place perhaps reconcile it to the loss of the fur it never had. Green brown, navy and black—shown by Chas. A. Stevens & Bros., Chicago. Price, \$55

velvet draped gracefully over his rail gave that new note so desirable this season to his costume. Mr. Berline was a symphony in black and French gray.

During the intermissions of the traffic, the conversation became general, and Mr. Brougham, as a man about town, was quite put to it to explain to pretty little Miss Sedan who was who in the pausing promenade. Mrs. Limousine graciously bowed to several of her family, which were very many indeed as the Limousines belong to one of the pioneer families, that is, pioneer beside the Sedans. Not that Miss Sedan did not belong in the company in which she found herself. She did, indeed, for her family had quite come up in the world.

The conversation being directed into the channels of fashion, Mr. Brougham remarked casually that the Limousines were, he thought, by far the best dressed cars nowadays. He went on to speak of the sea green costume of panne velvet and tulle with windows draped in white silk and a huge corsage cluster in a dainty cut glass receptacle; and the deep marine blue velvet with trimming of contrasting sequins; and the bronze velvet; and the jade green.

But Miss Sedan did not agree with him, and she was seconded warmly by Mr. Touring-Car and Mr. Berline, both impulsive young men. They chanted in chorus the wonders of wine velvet, black and gold brocade, Persian hangings, white satin with vivid green; and flesh colored broadcloth and robin's egg blue touches.

Mrs. Limousine laughed indulgently at all. She could afford to laugh. Her position is still that secure. The evening was very successful, and the drama started off auspiciously. Of course, it was boresome having to wait one's turn at the entrance, but so many had been the charms of the evening that one could afford to await one's companions in the atmosphere of dreams which so often hovers over music. Also it was a pleasure to be able to edge in ahead of a bare acquaintance, and there were several such among the friends and strangers. Mrs. Dowager Limousine and her party were quite fortunate in getting away together, however, but there was little talking as they rolled down the boulevards and avenues, for the charm of the evening was still predominant.

Change Made in Travel

Whether you ride in your own or somebody else's motor car to the opera or merely stand and gaze at the gifts the motor cars bring to the opera, you cannot help but realize the great change that has come in American locomotion since the advent of the motor car. It is computed that more persons travel by motor than by train from town to town and state to state. Look at your crowded streets with their traffic problems, and wonder how you ever did without a car.

The fragile gown of yesterday was pro-

tected not at all as the fragile gown of today is. Closed car and special heaters make unnecessary the clumsy, ungraceful wrap of all-engulfing embrace—and ruination of fluff and lightness. It would be hard to decide to whom the car has brought the most advantages—the man in his business interests or the woman in the added ease of shopping and dressing. Perhaps it would be best to decide in favor of both man and woman in the touring advantages. Judging from the opera, however, the woman has slightly the better of it.

Feminine Motor Notes

Women who drive their own cars have adopted the rubber shirts for damp days. These garments slip on over the head, and the fullness in the neck is caught closely by snap catches. The transparent rain-coats of rubberized silk, are also popular, but the shirt is somewhat newer.

The blanket coats are seen often in the car, too. It can be worn over the suit or dress coat and is usually left in the car. The coats can be obtained in various colors and designs and come in full or three-quarter length. Some have hoods, and most have convertible collars. The Australian wool coat is along the same line, having the added attraction of being very light in weight.

Now comes Smith Center, Kans., girls in a Cupid Association to discourage motoring. So large a hold has the car gained on the men nowadays, argue members, it is carbureter, spark plug, tire mileage, speed, miles per gallon and everything else but romance. The president of the association has received hundreds of letters from young men disavowing all knowledge of things motorized, it is said.

Speaking of things masculine and feminine in the car line, an Al-

bany, N. Y., woman advertised for a position as motor car salesman, saying a woman should sell cars to women. Well, Motor dom comes back and says that she is all wrong, that there would be more men who would want demonstrations than the women and that woman would prefer men agents.

The first lady of the land has learned to operate an electric and it is said President Wilson finds as much pleasure riding with her at the wheel as he does in one of the big White House touring cars.

If the bill now pending in the Idaho assembly passes, making a national park of the Sawtooth mountains in that state its success will be due in no small degree to the efforts of Idaho women, for the movement was started by Mrs. Jean Conly Smith and the women's clubs are fostering it. With this region as a national park further touring grounds will be open to the motorist, for already several routes lead into the proposed park, and state roads are being constructed over the natural roadbeds to and around the park.

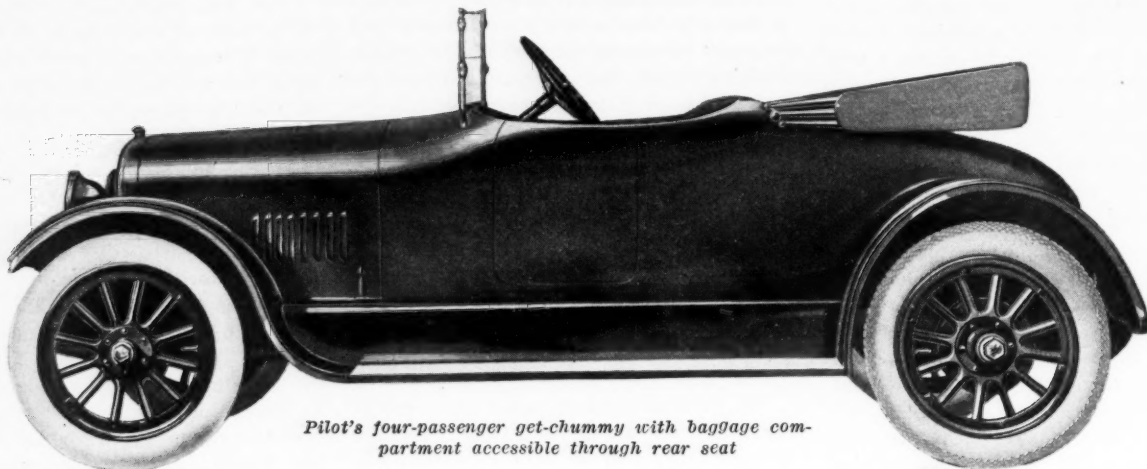


This coat did not have the heart, however, to remain away from his royal presence. Raccoon bedecks the collar. Novelty stitching also is used, and the belt is in two sections, so that the fullness is restrained effectively but not suppressed altogether.

The side front view shows the cape collar buttons and the gathers reveal pockets. In brown, green, black or navy—Stevens', \$39.50. The bag is one of the new beaded bags in silk gaberdine. This one happens to be an imported model—Stevens', \$19.50.

Pilot Supplants Big Cars with a Light Six

Offers Two Bodies, One a Get-Chummy Roadster, Listing at \$1,150



Pilot's four-passenger get-chummy with baggage compartment accessible through rear seat

A FIVE-PASSENGER double-cowl touring car and a four-passenger get-chummy on one chassis are Pilot's 1917 offerings. In introducing the new Series Six-45, the Pilot Motor Car Co., Richmond, Ind., announces that the two larger models previously manufactured have been discontinued. The past season demand for the smaller Six has converted this maker to the one car production, and as a large addition to the plant is now nearly completed, it is stated that production will be doubled. The list price is announced at \$1,150.

The new Six has a block-cast motor with $3\frac{1}{2}$ by 5 bore and stroke, of the L-head type. Cylinders are cast integral with the top of the crankcase. The cam, pump, and

with two inclosed universals with final drive through spiral-bevel gears. The rear axle is full-floating and torque is taken through a torsion rod fitted with spring-buffers and ball and socket joints. In the rear there are 52-inch cantilevers with internal-expanding and external-contracting brakes fitted with equalizers. The carburetor is hot-air jacketed and is gravity fed from the Stewart tank drawing gasoline from the 18-gallon tank on the rear. The electrical system is Delco with a starting motor operating through Bendix drive and the lighting equipment includes a Gould storage battery and dimmer-equipped headlights. The system is of the single-wire type.



Unusually long cantilever suspension on new Pilot six-45

magneto shafts are driven by helically cut gears and inclosed in an oil-tight case.

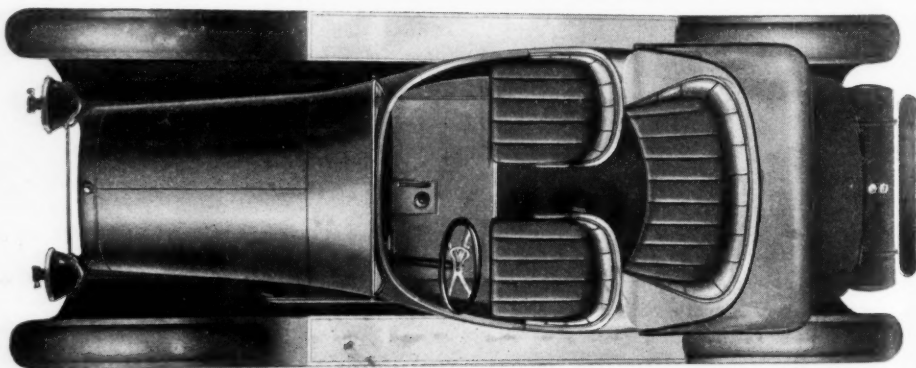
The cooling system is operated by a centrifugal pump in connection with a pressed-steel fan and cellular radiator. Lubrication is a combination force and splash system, the pump delivering oil to all bearings. There is an oil gauge provided which shows the amount of lubricant in the crankcase at all times.

There is a dry-plate disk clutch which, in conjunction with the motor and three-speed selective gearset, constitutes a unit powerplant. Transmission to the rear axle is through a tubular propeller shaft fitted

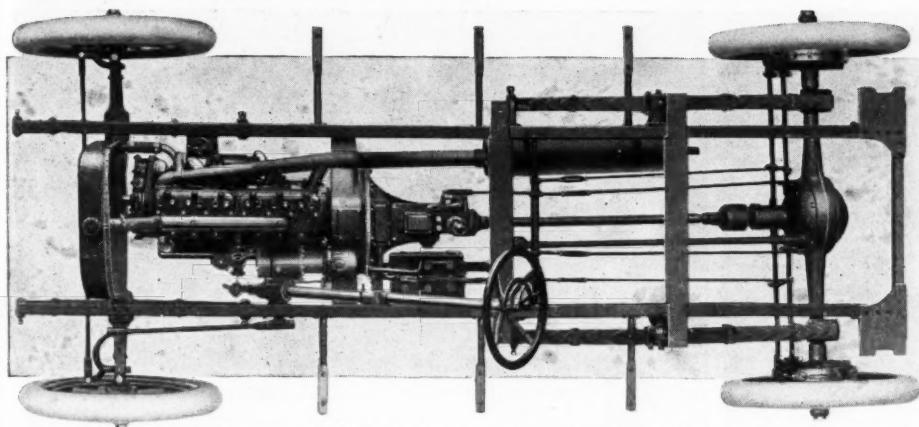
The pilot five-passenger touring bodies are of distinctive streamline design with double cowl and an adjustable ventilating windshield. The liberal size four-passenger roadster known as the Get-Chummy has divided front seats. As the rear seat is 41 inches wide there are ample accommodations for two passengers. An accessible suitcase apartment is located in the rear. Entrance to this is obtained through a section of the back of the rear seat which may be lifted out, making a large opening into the curved back of the body. This form of construction permits of a smooth graceful sloping effect without a door to break the continuity. Another point in favor of this construction is that no dirt or water can get into the compartment.

Upholstery is genuine leather carried over curled hair and steel springs. The standard finish for body, wheels, frame and running gears is dark Brewster green, with black fenders, hood and dust shields. Lamps are black, nickel trimmed.

Equipment includes an electric motor-driven horn mounted under the hood and operated by the button located at the center of the steering wheel; a Stewart-War-



Seating arrangement of Pilot four-passenger get-chummy roadster



Plan view of 1917 Pilot six-45. The car is Delco equipped

ner speedometer; a one-man top with dust cover and locking top holders and a tire carrier in the rear. The artillery wheels are fitted with demountable rims and 32 by 4 Goodrich tires, non-skid on the rear. The wheelbase is 119 inches.

COLUMBUS TRAFFIC LAW EFFECTIVE

Columbus, O., Nov. 18—The new traffic ordinance, adopted by the city council a month ago, went into effect November 9. Special instructions were given to the police department to carry out the provisions of the code. Under the new ordinance glaring headlights are eliminated and spot lights can be used under certain restrictions. Safety zones are established at all downtown crossings and pedestrians are prohibited from jay walking. The new ordinance is expected to produce more safety on the city streets.

MAKING FRONT DRIVE TRUCK

Warren, Pa., Nov. 18—C. A. Erickson, formerly with the Scripps-Booth Co., Detroit, Mich., is perfecting two models of a front-drive delivery truck in the plant of the Jacobson Machine Mfg. Co. The light delivery truck which Mr. Erickson is bringing out will carry from 1,000 to 1,500 pounds.

KNIGHT-MOTORED TAXIS

Cleveland, O., Nov. 18—Following the example of London Omnibus Co., which operates a fleet of 3,500 Knight motored cars, a number of the taxicab companies in this country have installed Knight motored vehicles in their service among them being the Toledo Transfer Co., and the Yellow Taxicab Companies, of Cleveland, Cincinnati, Columbus and Toledo, all of which recently installed a number of Willys-Knight limousines.

TEXANS BUYING MANY CARS

Austin, Texas, Nov. 20—As a result of the cotton crop bringing prices unprecedentedly high, except during the Civil war, money from the cotton crop is rapidly finding its way into all lines of business and the general prosperity of the people of the state is reflected in the increased demand for cars on the part of the residents of the cities and rural districts and

towns. Most of the dealers are so far behind in filling orders for cars that they decline to make definite promises as to the time delivery may be made.

It is conservatively estimated that there are now enough orders upon the books to bring the total number of cars in Texas up to more than 200,000 when all the deliveries shall have been made.

One of the significant features of the motor car trade in Texas at this time, as it relates to the farmers, is that the latter are buying much higher-priced cars than formerly. Many of them are acquiring two cars, one to be used as a general utility car and the other for more luxurious travel. The building of modern garages on the farms is another new and interesting phase of the situation.

The motor truck and delivery vehicle trade is also exceptionally good. The use of these vehicles is rapidly spreading to the smaller towns of the state. The larger industries which carry on business that

requires heavy hauling are adopting the motor truck almost universally. There has been a very large increase in the sales of the trucks and motor delivery cars in all parts of the state during the last few months.

CHANDLER PRODUCTION INCREASES

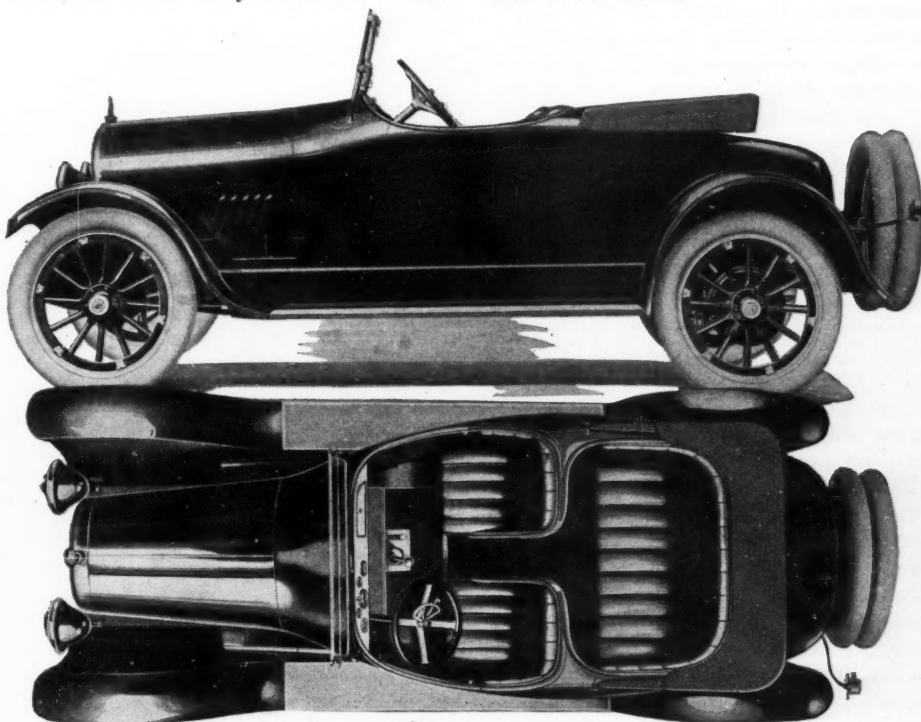
Cleveland, O., Nov. 20—The Chandler Motor Car Co. has given out a statement that it expects its production to double this year over last year. Increased actual deliveries of 352 per cent for October over the same month last year is announced. The Cleveland factory is to be augmented by the erection of two large buildings, with a total of nearly 200,000 square feet of floor space.

WESTCOTT HAS CLOVERLEAF

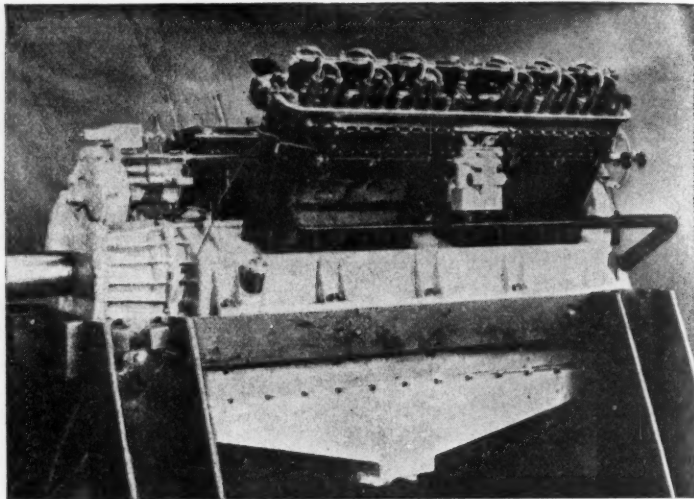
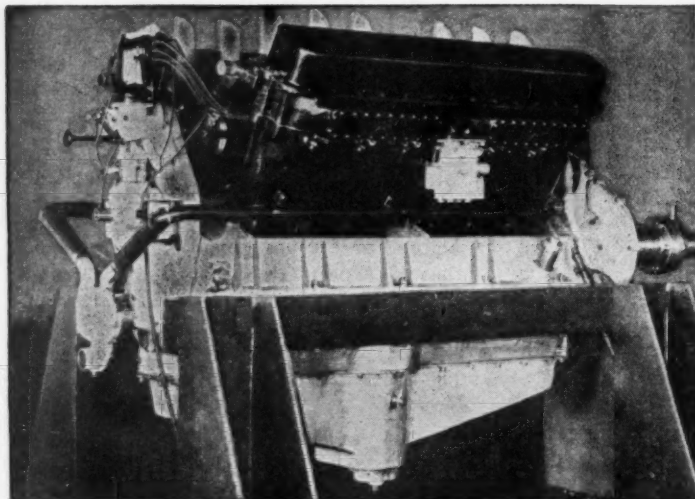
The Westcott Motor Car Co., Springfield, Ohio, announces a four-passenger touring cloverleaf roadster fitted to the new series 17 chassis. The designers have endeavored to embody unusual roominess for a body of this type without sacrificing grace and reference to the illustrations will lead one to believe that they have succeeded.

Entrance to the rear compartment is through divided front seats, with an aisle 9 inches wide. The rear seat is 17½ inches deep and 36 inches wide, and properly pitched to gain comfortable riding qualities. A clearance of 16 inches between the upholstery and the rear floor line of the front seats allows plenty of leg room.

The front section is identical in every way to the five and seven-passenger bodies. The seats are wide and deep and slightly pitched. There is plenty of leg room with the instrument board being within easy reach of the driver.



Roomy four-passenger roadster, the latest Westcott offering. Rear seats are 36 inches wide



Two sides of Knox aviation motor. The right hand picture shows the starting motor with switch located above the casing, which contains the reduction gear for propeller drive

Efficiency Displayed in Huge Aviation Motor

SPRINGFIELD, Mass., Nov. 18—One of the largest V-type aviation motors ever built in this country has recently been put through a series of tests at the Knox Motors Co. of this city, by Frank H. Trego, chief engineer and designer of the motor. The motor is intended for high power aviation work and is rated at 300 horsepower.

The motor is a twelve-cylinder, V-type, valve-in-the-head design and has aluminum cylinder blocks formed in groups of three, and the two sets of threes mounted at 60 degrees to each other. The bore and stroke of 4 3/4 and 7 give a piston displacement of 1,488.53 cubic inches. With this piston displacement the weight complete with starting and lighting motor and generator, ignition equipment, exhaust pipes, and tachometer is 1,400 pounds. This weight includes everything except the propeller sub, which is a part of the propeller assembly, although furnished with the motor. In the preliminary test a propeller speed of 1,140 and a motor speed of 1,600 revolutions per minute is used. Some conception of the work a motor of this type has to do is shown by the fact that the four-bladed propeller, 14 feet in diameter turns at 1,100 to 1,200 revolutions per minute. In this range of speed the tendency of the propeller blades to fly off the hub approximates 20 tons each and the propeller has a pushing power of 2,000 pounds.

Cylinder Blocks of Aluminum

The cylinder blocks are aluminum castings open at each end, and in which are pressed 1/8-inch cast-iron liners. These liners have a flange on the lower end and are pressed into the bottom. Although the cylinders are cast in blocks of three, the heads are cast in blocks of six and are of aluminum alloy with cast-iron valve seats, cast integrally with the head casting. The four valves in each cylinder are carried in the head and the water-jacketing so arranged

as to surround each valve seat. The water-jacketing of the cylinder blocks is so carried out as to extend below the bottom of the stroke and to allow 1/2 inch water space between adjacent cylinders. In addition each cylinder head has an aluminum cover which entirely conceals and protects all of the valve mechanisms.

The rotating and reciprocating parts of the motor have been designed with the thought of enduring the heaviest service imposed on an aviation motor. The crankshaft a chrome nickel steel forging is 3 inches in diameter at its three bearings as well as at the crankpins. The shaft has a total bearing length of 13 inches. It is drilled for pressure lubrication and held from longitudinal movement by a center bearing. The bearings are babbit backed by a bronze shell and secured by aluminum caps backed up by steel supporting plates

5/8 inches thick all over the bottom of the bearing.

The pistons of aluminum alloy, carry three rings and have the piston pin held in the upper end of the connecting rod with its bearing in the piston where the aluminum alloy serves as a bearing metal.

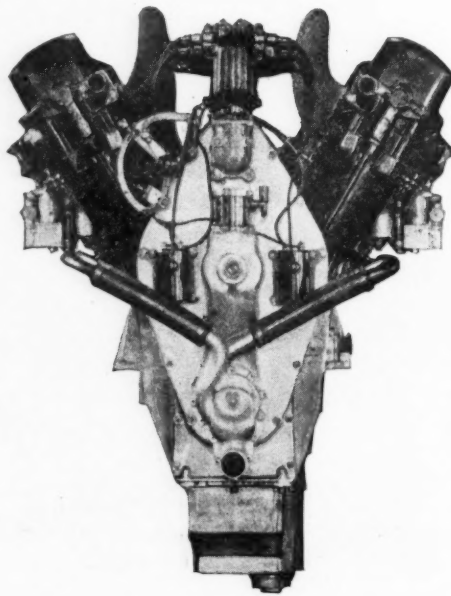
The crankcase is aluminum alloy formed in one piece and extending 7 inches below the center lines of crankshaft in order to give a barrel section for strength. The lower half is a one-piece aluminum casting bolting to the upper half and not containing any of the motor mechanism.

For attachment into the framework of the aeroplane supporting legs are not used, but support is through a shelf extending the full length of the crankcase on each side and on which the motor rests. Five bolts anchor each shelf into the framework of the aeroplane and to add rigidity a rib is cast on each side of each bolt. With this support the motor is kept very narrow at this point and will rest in a frame 15 inches wide inside and the bolt centers 17 inches apart.

The valve mechanism actuating four valves in each cylinder is operated through a camshaft lying along the head of each cylinder block, thus mounting the valves at a slight angle to the cylinder bore. The camshaft and rocker arms are supported in the head, the camshaft having eight bearings. The arc-shaped rocker arms are supported above it.

Accessories Driven Through Timing Gears

The method of driving the different motor accessories is through a longitudinal drive shaft above the crankshaft and driven by the timing gears. This drive shaft has two integral spiral gears, which are at the center of the motor for driving two vertical shafts. These extend up through tubes into the cylinder heads. Each vertical shaft terminates in a splined end over which is a splined cap piece,



Water-pump end of Knox twelve-cylinder aviation motor

which bolts to the short hollow shaft. The oil drainage from the cylinder head passes down through the ball bearings on the vertical shaft and thence through the tubes to the crankcase.

Motor lubrication embraces all of the moving parts of the engine. Oil flow originates in a pump supported from the upper half of the crankcase so that there are no pump connections between the pump and the motor. Steel pipes cast integrally with the crankcase register with the oil pump to make the necessary connections.

The oil is taken in the crankshaft bearing at the timing gear and back to the horizontal driveshaft bearing immediately above it, and thence is led through the hollow driveshaft to the center or either end of the shaft whence it flows through copper tubes to the cylinder heads. In each head it passes through the camshaft supporting brackets into the hollow cam shaft, thence to all its bearings and to the hollow rocker arm shafts and to each rocker arm. The result of this oil circulation is that valve-stems, springs, rocker arms, rollers, camshafts, and other moving parts are saturated at all times.

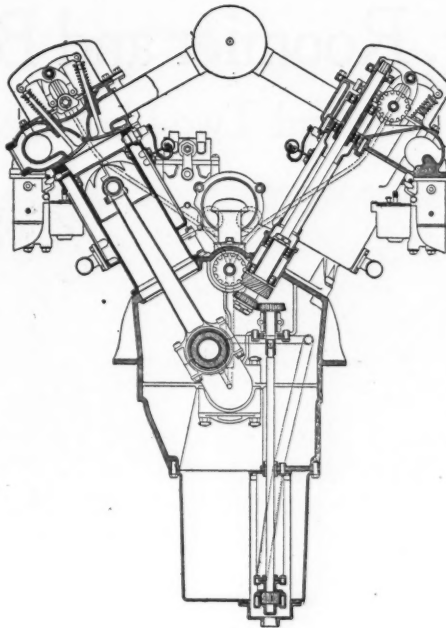
Double Zenith carbureters are placed in each side of the motor outside of the cylinder blocks, thus using a separate carbureter for each three cylinders. There is nothing on the outside of the motor excepting these carbureters; and there is nothing in the V between the blocks excepting the two breathers.

The electric starting motor and the light generator are built into the engine, the former so that starting is by pressing a button which throws the switch.

Battery Ignition

Ignition is with the current furnished by the battery used for starting, or when running with current from the generator. There is one spark plug in each cylinder. All six priming cocks on each side of the motor can be operated at once by a pull-handle. Gasoline feed is by pressure furnished by a two-cycle type of air pump furnishing pressure of 4 to 7 pounds. An adjustable regulator is attached.

At a test of this motor made at the Knox factory a run of 8 hours was made. During the first 7 hours the motor speed was from 1,400 to 1,600 revolutions per minute pulling a load of 200 to 245 horsepower. For the last, or eighth hour, the speed was 1,600 revolutions per minute pulling a load of 300 horsepower. The average horsepower for the 8 hours was 243 giving a total of 1,948 horsepower hours with a gasoline consumption of 198.4 gallons. This is .612 pounds per horsepower hour, which could scarcely be taken as a fair test as you cannot expect to get a true test with $\frac{1}{4}$ and $\frac{1}{2}$ throttle conditions. After the test was on for 40 minutes a stop of 2 minutes was made to change a spark plug, but after this no spark plugs were changed and no air of any kind was blown upon the plugs. The water temperature was 108 degrees Fahrenheit at the entrance and



Section through Knox motor showing method of camshaft drive for overhead valves

140 degrees at the discharge. Air temperature was 62 degrees at the start and 78 degrees at the finish, in the testing room.

The test was made in the laboratory of the Knox company with a Sprague electric dynamometer.

BIG GOVERNMENT GARAGE

Fort Sam Houston, Texas, Nov. 18—When the new garage of the United States government at the military post here is built it will be the largest in this country for the accommodation of motor trucks. Plans and specifications for the buildings and their equipment have been prepared and the work of erecting them will be started soon. The garage will be divided into about thirty-five units, each of a capacity to accommodate a motor truck company of thirty-three machines, or a total

of 1,155 motor trucks. Machine shops will be built in connection with the garage and whenever a motor truck company is brought in from the border the machines are to be placed in the shops and thoroughly overhauled. The machine shops will be constructed of pressed-steel units and will be put together by means of bolts so that they can be taken down and moved on short notice at any time.

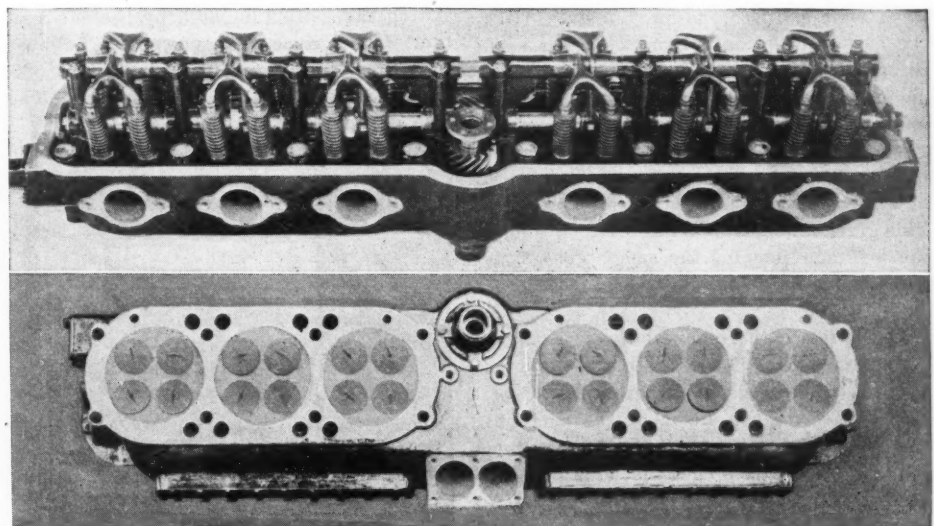
At this time there are more than seven hundred army motor truck lines up in long rows at Fort Sam Houston. The machines have no protection from the weather and it is in order to preserve them as much as possible that the garage and machine shops are to be built.

The sheds or garages will be built of wood and galvanized iron. Each shed will be 180 by 44 feet, and besides being large enough to accommodate an entire motor truck company it will hold the small officers' cars attached to it. Major Albert C. Dalton, of the quartermaster's department, will be in charge of the construction work.

At Fort Bliss, near El Paso, a 20-shed garage and machine shops will be built for the accommodation of the motor trucks of that part of the border.

HIGHWAY BUILDER DIES

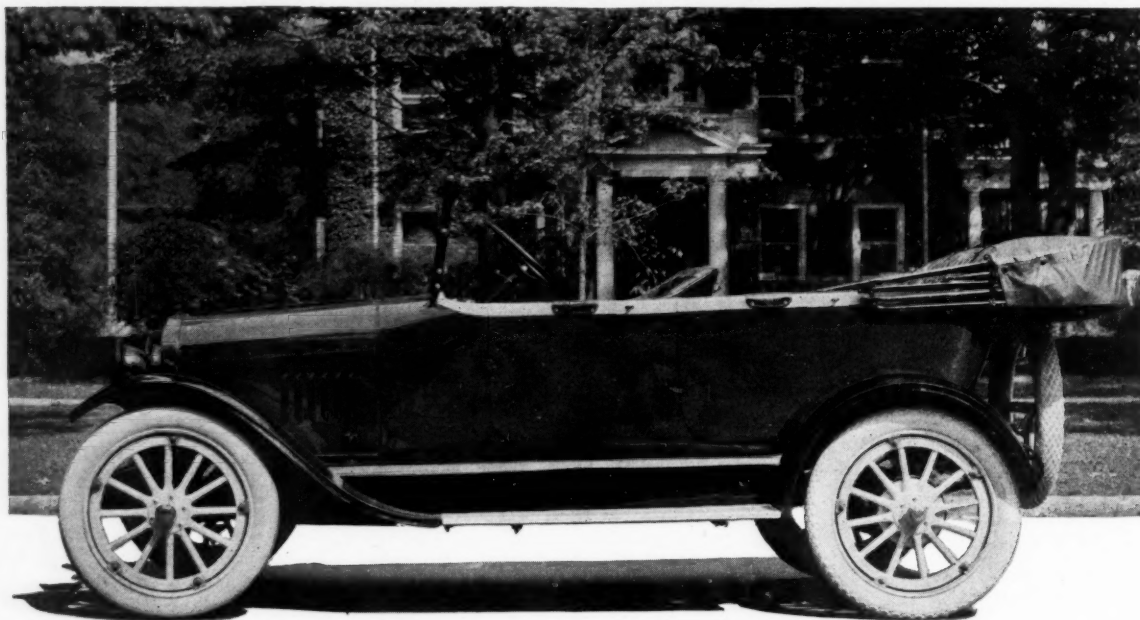
Gloucester, Mass., Nov. 18—Walter Cresy, a pioneer road builder, who built many miles of the first macadam highways ever constructed in New England, or in this country, dropped dead here as he was preparing to leave home to superintend a job. He had a national reputation as a road builder and was one of the first contractors to solve the problem of road preservation from motor car wear through the use of oil and tar compounds. Formulas that he evolved became standard for this sort of work in many states. Much of the Massachusetts state highways were constructed by him and his advice was often sought by highway builders in other states.



Top and bottom view of cylinder head, which is a one-piece aluminum casting with cast-iron valve seats

Princess Larger, Roomier and Better Equipped

New Floating Axle and Two-Unit Electrical System



The roomier Princess for 1917 with a 4-inch wheelbase increase

TAKING the new Princess car as a whole, it is larger, roomier and has better equipment than previously. The wheelbase has been increased from 104 to 108 inches, providing 4 inches more in length, which has all been taken advantage of in working out the body space. This is the main factor in making the car larger and the difference is immediately apparent when this year's offering of the Princess Motor Car Corp. of Detroit and the new are side by side.

In addition there have been numerous mechanical alterations. The rear axle is entirely different in design, now being floating instead of semi-floating. The starting and lighting system is now a two-unit device instead of a single unit, but it is still a Disco, as previously. With the new installation a Bendix gear is used for the starting motor, whereas the motor-generator outfit previously used had a silent chain reduction of 3 to 1.

To take care of the larger car, bigger brakes have been installed. These are now 12 by 2¼ inches instead of 12 by 1¾. This gives a longer wearing break although the leverage remains the same. The tires are also larger, being 32 by 3½, instead of 30 by 3½.

In the motor there have been no changes of importance, although there are, perhaps, a dozen alterations of minor consequence. For instance, the position of the magneto has been altered, and the oiling system changed in detail. There is a detachable head unit.

The speedometer drive is now from the transmission gears to eliminate the unsightly attachment at the front axle and

also for the sake of quietness. The matter of sightliness has also been given attention in other details, particularly in the overhauling of the fenders and running boards. The running boards are now linoleum on wood, aluminum bound, instead of aluminum on sheet metal. This is better construction right through; besides being more sightly it is also stronger and does away with rattles. The front fenders are so formed that they are virtually sill boards also, this removes all the cracks and prevents the entrance of any dirt or water.

New Sloping Windshield

A sloping windshield has been fitted instead of the vertical. This is not only for appearance, but also for strength in taking the strains imposed by the one man top. The Princess company also believes that this type of windshield provides better vision in driving against the sun. The side curtains are improved.

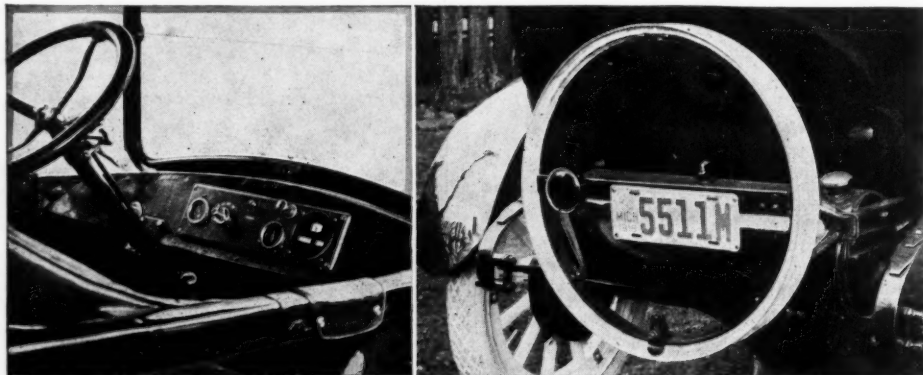
An improvement has been made in the

grouping of the instruments on the instrument board. This instrument layout is now integral and contains the Van Sicklen speedometer, speedometer light, ammeter, oil gauge, King lock, and fuse box with spring-attached cover. By taking out four screws the entire instrument assembly can be lifted out whenever necessary for repair or inspection.

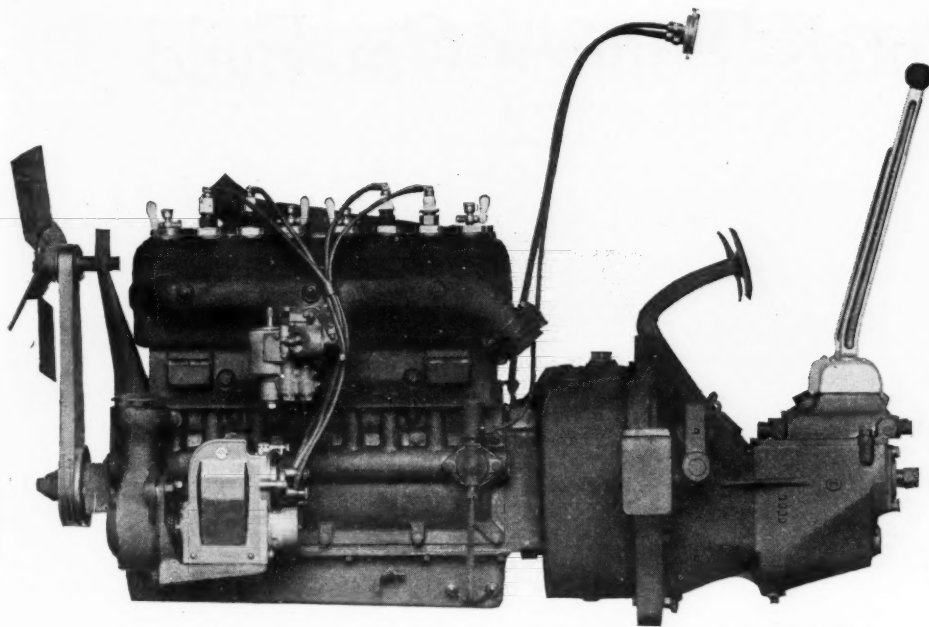
The powerplant of the Princess is in a unit with the clutch and gearset, the engine being a four-cylinder, L-head block with the valves on the left. The cylinder dimensions are 3¼ by 4¼, giving a rating by formula of 22.5, and a piston displacement of 187.9 cubic inches.

Silent chain is used for the drive of the timing gears and magneto and the chains run in oil and have provision for adjustment. The lighting generator is also driven by silent chain eliminating all gears.

Oil is pumped by a plunger pump driven from the No. 4 exhaust cam. This delivers the stream to a sight feed on the dash



Improved grouping of instruments and compact rear accessory assembly of Princess



Carburetor side of Princess L-head 3 3/4 x 4 1/4 motor, showing method of wiring to the spark plugs

from where it is led to the main bearings and from thence to the splash troughs where the cylinders and other internal motor bearings are taken care of by the dip of the rods. The silent chain drive for the auxiliary devices is also cared for in this system by a separate lead which keeps the chain running submerged in lubricant.

Ignition is provided by a Splitdorf Dixie type of magneto and carburetion by a Schebler instrument.

From the engine the drive is transmitted through a single steel dry-plate clutch to the Grant Lees three-speed gear box. The drive is the customary shaft with two universals. The rear axle is floating and the rear springs are three-quarter elliptic with the main leaf of vanadium steel. The frames are pressed steel channel and the wheels are of hickory fitted in the rear with the 12-inch brake drums. The service brake is external contracting and emergency internal expanding on the rear wheel drums.

Fully equipped the car sells for \$775, f. o. b. Detroit. The standard equipment includes electric starting and lighting, speedometer, neverleak one-man top, two-piece rain-vision windshield, two electric lights with dimmer, dash lamp, number bracket, robe rail, tire holder, extra rim, tool kit and electric horn.

RAILROAD MINIMIZING ACCIDENTS

Boston, Mass., Nov. 18—As a result of investigations following accidents at railroad crossings of the New York, New Haven and Hartford Railroad the officials of the road have decided that the mere waving of a white or yellow flag at a crossing is not sufficient warning to motor drivers, so it has equipped all its crossings tenders with a round white disk about a foot in diameter. There is a handle to it that allows the tender to raise the de-



The 1917 Princess head on. There is a clean body sweep from front to rear

vice above his head. Painted on both sides in large black letters is the word "Stop." When a crossing tender holds it above his head it may be seen half a mile away on a level road.

The Motorists' Bookman

Treatise on Oxy-Acetylene Welding

A practical treatise covering the repairing of motor cars by the oxy-acetylene process of welding, embodying non-technical explanations of the principles to be guided by in the successful welding of various metals has just been published by the Norman W. Henley Publishing Co., New York. The title is Automobile Welding with the Oxy-Acetylene, and the author is M. Keith Dunham. Price, \$1.

The edition covers a description of the

necessary apparatus with directions for the care of the various parts, location of the equipment for the most efficient operation, and detailed instructions for operating on cast iron, aluminum, steel, malleable iron, copper, brass and bronze. There is also a chapter given over to methods of carbon burning from cylinders and the use of the welding flame in lead burning, soldering and case hardening.

To complete the work there is a chapter telling how to figure welding costs with tests for torch and acetylene generator consumption and a suggested cost card.

New England's Beauty Described

A motor car, a charming heroine and the "Ideal Tour" through the White Mountains and others of green and blue in New England have given the Williamsons, C. N. & A. M. the theme for their "The Lightning Conductor Discovers America." Though romance adds the spice of life to it all, more than fiction is contained in this celebration of the beauty of New England.

Long Island, the Hudson, Maine, Massachusetts, New Jersey, Pennsylvania, the Berkshires and the White Mountains are the field of four cars filled with interesting persons, among them a convalescing English soldier, who is the lightning conductor. Much of value to Americans is to be learned through the conductor's pursuit of historic knowledge. Besides, such an attractive picture of New England is given that one believably might plan to follow in the footsteps of these the latest creations of the Williamsons. Doubleday Page & Co.—\$1.50 net.

REPEAL DIMMER LAW

Racine, Wis., Nov. 18—The first instance on record in Wisconsin of the repeal of an anti-glare or dimmer ordinance because its restrictions are of more damage than benefit, is the action of the common council of Racine, on November 9, in repealing the dimmer ordinance passed several months ago. Inquests on two deaths by motor cars in that city during the last 2 weeks appeared to determine that the principal cause was dimmed lights used on poorly lighted streets. Agitation for the repeal of the ordinance immediately arose and resulted in a repeal with but little dissent.

FISHER EARNINGS INCREASE

Detroit, Mich., Nov. 17—The sales of the Fisher Body Co. for October amounted to \$1,470,000, a gain of 90.12 per cent as compared with the sales of October, 1915, which amounted to \$773,000. The business for the 8 months from March to October, inclusive, for this year, displays an increase of 79.74 per cent as compared with a similar period for the preceding year. It is estimated that the net profits are approximately \$200,000 a month, which represents an annual rate of about seven times the preferred dividend requirement, as against four times that earned in 1915 and 1916.

Monroe Enters Touring-Car Field

**Offers 115-Inch Wheel-
base Five-Passenger
Touring Car at
\$795**

THERE is now a touring model in the Monroe line, which previously offered roadsters only. The new car, model M-4, is roomy, with its 115-inch wheelbase and the modern straight-line center-cowl effect. It embraces the latest in construction ideas, particularly in the frame, which is the deep-section design in which the mud aprons and running boards are part of the structure.

Everything about the car is in line with the latest tendencies. The overhead-valve motor, detachable cylinder head, big valves, dryplate clutch, slanting windshield and cantilever springs, are a few of the high spots chosen at random to illustrate that the latest practice in everything has been studiously followed in this moderate weight touring car, which is to sell for \$985 f. o. b. Pontiac, Mich.

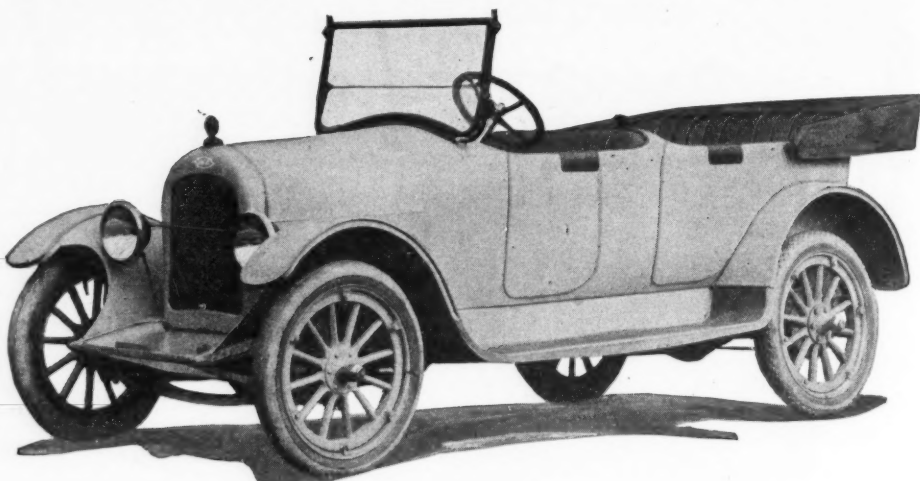
High-Speed Powerplant

Even a casual inspection of the powerplant will disclose its high-speed characteristics. The ports are large and the overhead valves are carried directly in the head. There are no sudden bends in the gas passages as the intake manifold is integral with the engine head.

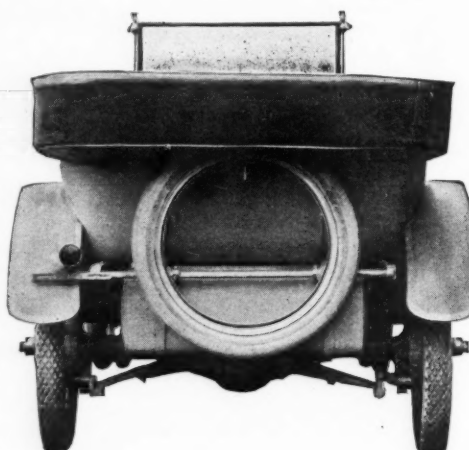
The cylinder block is cast integrally with the upper part of the crankcase. It is of grey iron. The dimensions of the cylinders are $3\frac{1}{4}$ by $4\frac{1}{2}$, giving a piston displacement of 150 cubic inches. The entire combustion chamber is exposed by the removal of the upper part of the engine formed by the head casting and the valves are also very accessible as the push rods are carried down on the outside and there is also no difficulty in reaching them from above by removing the nuts from the top.

Force-feed lubrication is used with a hollow crankshaft through which a gear pump driven off the camshaft forces the oil to all bearings. There is a pressure gauge on the dash which indicates at all times when the system is working. Carburetion is taken care of by a Zenith instrument and ignition by the Connecticut system, driven off the camshaft. Both the carburetion and ignition are very simple as far as the driver is concerned, the carburetor has a fixed adjustment which need not be altered after the car has left the factory. The gasoline tank is carried at the rear of the chassis frame, and has a capacity of 14 gallons. The feed to the carburetor is by gravity from the Stewart tank.

Starting and lighting is accomplished by a two-unit Auto-Lite system in which the



Double-cowled Monroe touring car. The body lines are thoroughly in keeping with modern practice



Rear view of Monroe. The compound cantilever suspension may be seen

generator is belt-driven, while the starting motor engages with the ring gear on the flywheel by means of a Bendix attachment. The battery is an L.B.A. This gives a very compact electrical layout and the same idea of clean-cut electrical mounting is noticeable in the ignition where the coil and timer-distributor are side by side. This cuts the length of the high-tension leads, lessening the electrical losses through leakage and resistance.

A multiple-disk clutch having six dry plates is used to transmit the power from the engine. The clutch is housed within the flywheel and transmits the drive through a facing of Raybestos against steel. From the clutch the drive passes through a three-speed gearset which is part of the unit powerplant formed by engine, clutch and gearbox.

Two universals are used on the drive shaft and the rear axle is a floating design with a pressed-steel housing and axle shafts of alloy steel. The axle housing is reinforced by the insertion of nickel-steel tubing. The pinion and ring gear are spiral bevels and a factor in the lightness of the

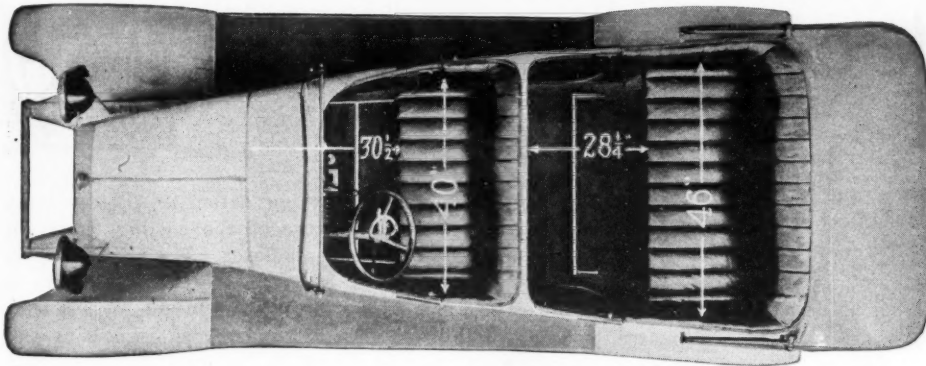
axle is in the keying of the rear wheels directly to the outer ends of the live axle shafts. The reduction in the rear axle gives a clue to the high-speed characteristics of the engine, as it is $4\frac{1}{4}$ to 1. Another feature of interest is in the use of the M. and S. differential as stock. This differential has as its feature the delivery of traction on both wheels.

Brush Frame Used

In the structural part of the frame, the general layout of the Brush deep-side-member arrangement is used. The longitudinal members are 6 inches in depth, with the steel running boards, hot-riveted to the side members forming part of the frame. This design makes it unnecessary to use heavy sills for the body and also does away with the step hangers and the side shields. The entire assembly has the effect of strength with minimum weight.

Compound-cantilever rear springs are used, mounted across the rear of the chassis. This type of spring, which is a rather unique kind, has claimed for it elimination of side sway. In the Monroe application, it is fitted throughout with self-lubricating shackles, which tend to reduce the necessity for frequent attention and also add to the life of the parts and produce quietness.

A full five-passenger capacity is given by the body. The upholstery is in machine-buffed leather and a double-cowl effect is secured in the moulding of the back of the front seats. The doors are given an added touch by the use of leather flaps. As a comfort feature the upholstery is lined with curled hair and is mounted over cushion springs. Carpet is placed in the rear tonneau and there is space under the front seat for the jack, pump and heavy tools. All the doors have pockets, the front left hand door being made to carry an assortment of small tools. The finish is in standard black with nickel trim. The fenders are crowned with curved



Top view of Monroe showing interior body dimensions

steel running boards having metal bound linoleum pads. The windshield is sloping with the glass overlapped to eliminate rain leakage.

For a color choice the Monroe company offers royal blue with cream or red wheels. The finish of the metal work is black as

stated. Full equipment is sold with the car, this including besides the accessories mentioned, a heavy rubber one-man top, Collins curtains, electric horn, extra rim and carrier, Connecticut lock switch, Stewart Warner speedometer muffler cut-out and complete set of tools.

Solid Tires Have Deeper Section

(Concluded from page 29)

Republic and Swinehart have recently brought out tires of deeper section.

The Gibney Tire and Rubber Co., has a tire of deeper section and the Goodrich company brought out a tire of deeper section some time ago, known as the DeLuxe. So it is seen that the tendency is toward tires of greater depth.

The need for greater resiliency in truck tire construction is evidenced in the development of large single tires and tires of deeper section but this is only the beginning. Cushion tires for use on large capacity trucks are now being made by Goodyear, Swinehart and Firestone, and

large size pneumatics are coming in for a large share of attention.

Surprising developments may be looked for in the production of pneumatic equipment for even the largest trucks. Good-year, Goodrich, Pennsylvania and United States are now making giant pneumatic tires and many others are experimenting and will undoubtedly bring out models within the coming year. One of the largest concerns is working on a special cord tire construction; another concern is experimenting with a tire specially designed to meet truck needs and which is a radical departure from pleasure car practice in that the section is roughly oblong instead of round; the long side is on the ground.

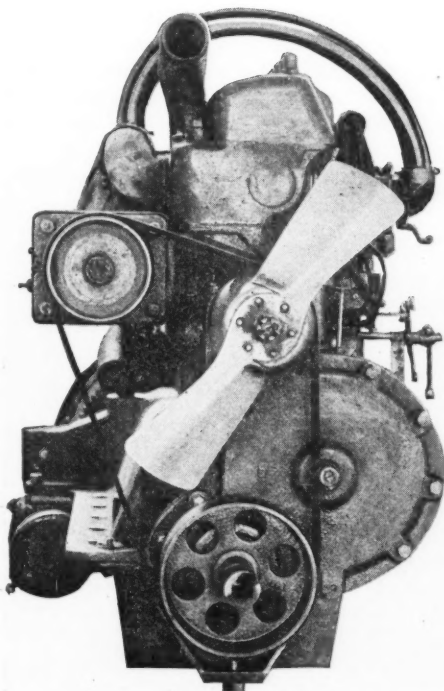
On first consideration it seems unbelievable that the total operating expenses of a 5 or 6-ton truck, not to mention smaller

ones, might be reduced by fitting these mammoth air-filled tires in place of the relatively unyielding solids, but a careful study of the situation shows that there are good grounds for this belief. While at the present time large pneumatics cost about twice as much as solid tires which they replace the difference is more than compensated for by the reduction in mechanical upkeep and increase in operating efficiency of the truck. At least this is what the champions of this type of tire claim.

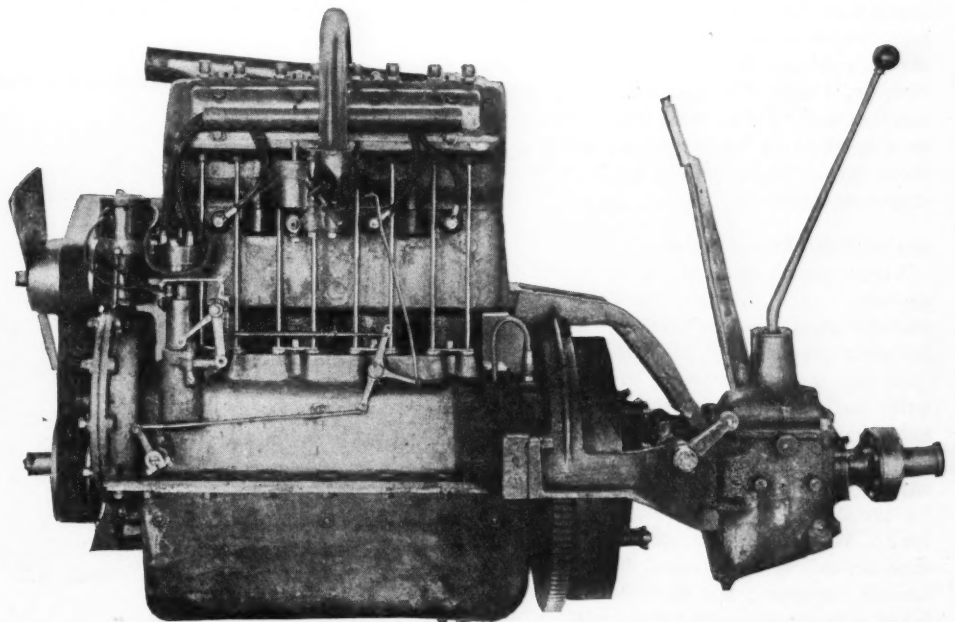
But this is not all. The speed of the truck may be considerably increased with but a slight additional maintenance expense. Now the economy of a motor truck over horse-drawn vehicles is not a matter of extra capacity but of greater speed and mileage ability. The motor vehicle effects a saving because it can cover more miles per day for the same amount of money, or possibly even less money. Also the cost per mile of operating the truck drops as the distance covered per day rises. In other words there are certain fixed charges which are the same whether the machine is run 1 or 100 miles per day. These include driver's salary, insurance, interest and depreciation of investment, garage rental, etc.

With solid tires the maximum speed may be 10 miles per hour and even then the maintenance charges may be excessive, and yet with pneumatics, the speed may be jumped to 20 miles per hour with a large reduction in maintenance expense, and a big saving in the overhead charge per mile so that the total cost per mile may be greatly lessened notwithstanding that the tire cost per mile may be doubled.

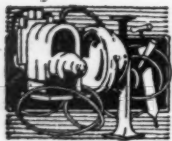
An interesting development in solid tires is the introduction by Kelly-Springfield of a triple tread tire in place of the more usual dual for heavy duty. Reduction in wheel weight, better traction and improved wearing qualities are claimed for the new design.



The unusual methods of fan and generator drive in the Monroe motor is evident in this illustration



Carburetor side of Monroe motor. The gearset is supported by a spider bell housing



The Accessory Corner



Lock Frees Steering Wheel

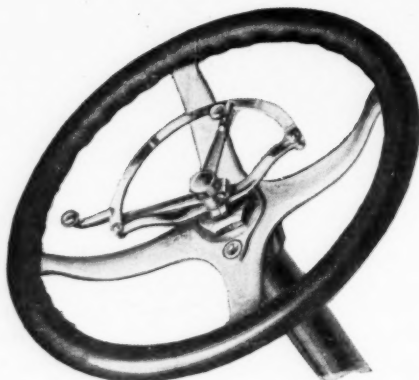
BY TURNING a key half a revolution, pulling the steering wheel up an inch or so and turning the key back to its original position the steering wheel is entirely disconnected and at the same time locked away from the steering mechanism, although the front wheels are free and the car may be moved but not towed. This is the principle in the new Perry lock for all makes of cars, made by the Perry Auto Lock Co., 1238 Michigan avenue, Chicago. In the Ford type the standard cap which surrounds the steering pinions directly under the steering wheel is replaced by the Perry lock cap, which includes the complete locking mechanism. When the lock is operated the pinions are thrown out of mesh by moving the internal gear up and out of engagement. In the type for other makes there is a hub which is rigidly keyed to the steering post. On top of this hub is a hexagon nut, which fits within an internal hexagon piece, which is a unit with the steering spider. When the car is ready for driving this internal hexagon fits over the nut like a socket wrench, and when locked the nut is raised above and out of the internal hexagon, permitting the wheel to spin free. Tumbler locks are fitted with special keys for each. The price of the Ford lock is \$5 installed.

Converts Ford for Overhead Valves

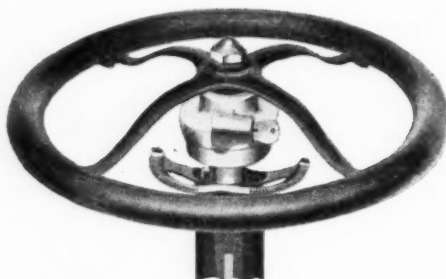
It is now possible, by removing the cylinder head and push rods of the Ford motor and inserting new parts in their place, to convert the Ford motor into an overhead-valve type, which, with the use of 3 to 1 gearing, it is claimed will permit a speed of 80 miles per hour. The attachment requires no alterations in the main motor casting. It is the design of D. R. Noonan, Paris, Ill., maker of high-speed camshafts for Fords, who states that he is in a position to make prompt delivery to those who wish to convert their Ford cars into speedsters.

Sealed-Joint Piston Rings

Victor piston rings are composed of two sections; each section being concentric in form with tapering sides which provide for even expansion. The ends of each section are lapped between the inner and outer walls of the ring, which construction is designed to prevent gas from escaping to the under side of the ring and forming carbon deposits. These are being marketed by the A. E. White Machine Works, Eau Claire, Wis., for prices at 75 cents and \$1 each depending on the size. The same concern is marketing the superior ring which is of one-piece construction with a lap joint. Prices are from 18 cents to 25 cents



Perry lock as applied to conventional type of steering wheel. Note keyhole in spider



Perry lock for Ford cars. When locked the steering wheel spins free from the gearing

each. Another product of this company is a demountable-wheel equipment for Ford cars. The wheels require the removal of one nut for changing, this nut being located on the hub in the center of the wheel.

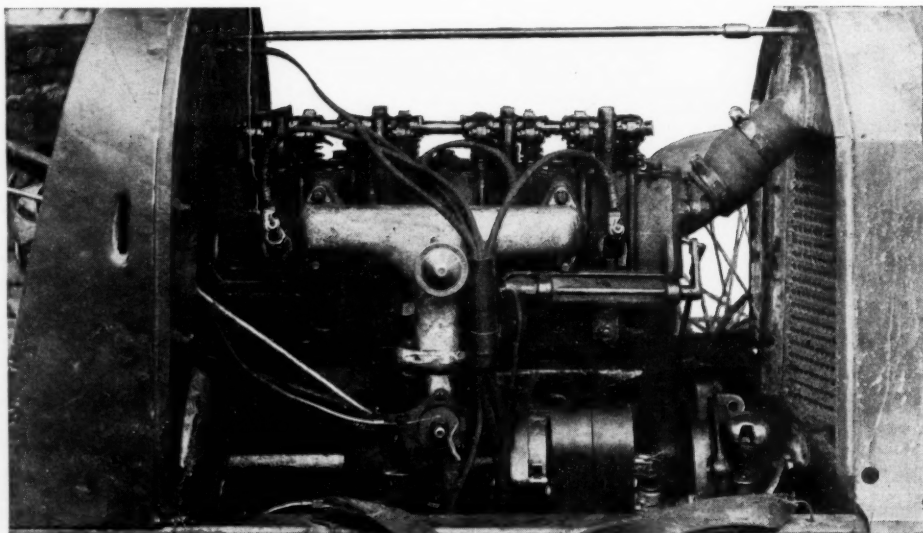
Sylphon Thermostatic Regulation

A butterfly valve is mounted in a suitable casing in the lower water line connection and this valve is operated by a

thermostat which automatically regulates the temperature of the cooling water, in the Sylphon regulator. The thermostat is connected by a flexible brass tube to a small bulb inserted by means of a special fitting into the upper hose connecting the cylinder block to the radiator. There is sealed into this bulb a volatile liquid, which, when heated, gives off a vapor having a powerful expansive force. The liquid is sensitive to heat, and never evaporates or deteriorates. The pressure of the expanding vapor is transferred through the tube to the regulator, which expands or contracts under its influence, thereby operating the valve. The Sylphon is made from one piece of brass of uniform thickness, which is folded to form a highly flexible member. This is joined to the top and bottom pieces. The type B regulator can be fitted to about 95 per cent of all cars and it is claimed that any capable garage mechanic can install one in 1 hour. Either 1-inch, 1¼-inch, 1½-inch, 1¾-inch or 2-inch hose connections will be furnished as required. The price of this type is \$17.50. F. R. Blair & Co., 50 Church street, New York.

Crowe Mechanical Fan Belt

The Crowe mechanical fan belt for Ford cars bears the following claim from the makers: Non-skid, never come off, ventilated leather, readily adjustable, exerting twice the pull under the same tension. It is constructed of oak sole leather blocks, built into a steel-chain background. The leather blocks furnish traction and insure silence while the chain takes care of the pull. The caterpillar-tread principle makes the belt cling to the pulleys regardless of oil. There is a disconnecting link for



Overhead-valve attachment for use on Fords. A new cylinder-block assembly and push rods constitute the equipment

quick installation. The old Ford size is 24 inches and the 1917 size, 27 inches. The price is \$1. Mechanical Belt Co., St. Joseph, Mo.

Heater to Boil Gasoline

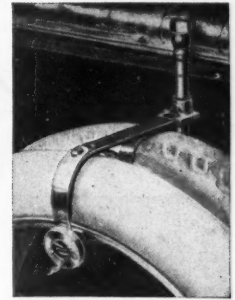
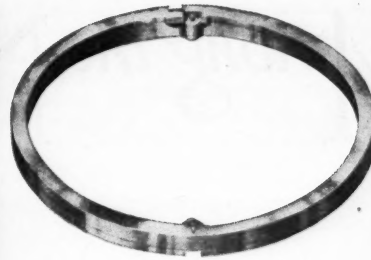
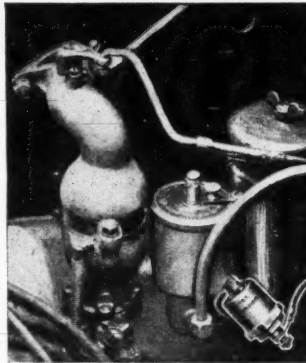
With a small electric heater attached to the float chamber of the carburetor it is claimed that gasoline may be boiled, and thus vaporized, in 1 to 2 minutes, with no more current being consumed than is drawn for the headlights. The cold gasoline runs into an outer chamber in the heater, then into an inner chamber where a coil is located. By turning a switch on the dash the gasoline in the carburetor begins to heat. The accessory is known as Thorwald's carburetor heater and is being marketed for \$5 by the E. H. Sprague Mfg. Co., 606 South 14th street, Omaha, Neb.

External Contracting Brake for Fords

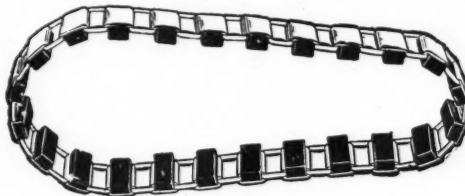
A pedal-operated, external-contracting, rear-wheel braking system for the Ford is made by the Rischmuller Co. Garage, 4118-20 Grove street, Oakland, Cal. The transmission brake is removed and in its place a special pedal mechanism installed, and operated external-contracting brakes attached to the rear wheel brake drums. The pull from the pedal is transmitted through an equalizing bar to two steel cables and thence to the brake contracting lever. This lever swings on a hanger that is bolted to the brake flange, as is the restraining strap that prevents the brake from rattling. It is claimed that by applying the braking pressure to the rear drum instead of to the transmission all strain on the rear axle is eliminated, with its attendant chattering. Price, \$12.50.

Corning Conaphore Lens

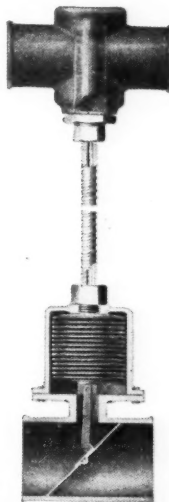
A corrugated headlight lens made of yellow tinted glass is the product of E. A. Cassidy Co., 30 East Forty-second street, New York. The outer surface of the lens is smooth, the inner carrying a series of horizontal corrugations, said to bend the light rays down, and concentrate them in a long intense beam, that is never more



Left—Electric heater which boils gasoline in carburetor. Center—Sealed-joint two-piece piston ring. Right—One of many uses for Apeo lock



Steel and leather adjustable for belt for Fords



Thermostatic regulator applicable to nearly all makes of cars

than 42 inches above the road. The yellow tinted glass is claimed to penetrate dust

and fog, in addition to decreasing the glare. As the outer surface of the lens is smooth, it does not hold the dust, and may be readily cleaned. Price, 5 to 6½ inches, \$2.40 per pair; 7 to 8½ inches, \$3.50 per pair. Other sizes in proportion.

Transfer Monograms

Initials, monograms or special designs may be attached to the surface of the car by means of transfers made by the Motorists' Accessories Co., Mansfield, O. As supplied by the manufacturer, they are printed on two thicknesses of paper, and are applied to the car by a special cement. The paper is then dampened and removed, leaving the letter or design on the car. It is claimed that the transferred letters will last as long as the finish of the car and are more artistic than if hand painted. They sell for 5 cents each.

Lock for Many Uses

The Apeo lock may be used for securing spare tires, locking tool boxes, trunks, garage doors, etc. It is offered in three styles, one with a straight bar, one with a single-hinge bar and another with double-hinge bar. There are 100 key changes in the locks and two keys are supplied with each. The push button on the rim of the lock, when pushed clear in, will spring the lock mechanism. There is a circular button on the face of the lock used to form a temporary lock and keep out dirt. Prices, per dozen, are: No. 20, straight hasp, \$5.50; No. 21, single hinge, \$6; No. 22, double hinge, \$6.50.

Garage Signs

A combination of the transparency and panel sign, illuminated by light reflected downward by a hood is made by the Federal Sign System, 1790 Broadway, New York. Three 60-watt lamps are located directly above the panel, reading "Garage," and behind the glass transparency reading "Gasoline." The panel measures 54 by 18 inches, the transparency 54 by 10 inches, and is furnished with any reading matter desired. A complete line of electric signs is offered. Price, with hanging rig, but without lamps, \$46.



Simple demountable-wheel set for Fords



Among the Makers and Dealers



CHALMERS SALES SCHOOL A SUCCESS—Realizing the scarcity of good salesmen, Hugh Chalmers has established in the Chalmers plant a training school for salesmen. The school has been in

existence for 5 weeks, and has an enrollment of over 100 students, recruited from the factory and office men employed by the Chalmers company.

GRAVES TO RUSSEL AXLE CO.—Harry S. Graves has been appointed sales engineer for the Russel Motor Axle Co., North Detroit, Mich. Mr. Graves was formerly with the General Motors Co.

Scott to Represent Denneen Co.—S. R. Scott has been appointed district sales representative for Denmo trucks by the Denneen Motor Co., of Cleveland, O. He has been with the White Co. several years and recently was assistant works manager for the Warner-Sawasy Co.

Wilttrout to Crow-Elkart Co.—R. S. Wilttrout has been appointed efficiency manager of the Crow-Elkhart Motor Co., Elkhart, Ind. Mr. Wilttrout was with the Stewart-Warner Speedometer Corp. for several years and was manager of the John W. Blackledge Mfg. Co., Chicago, 3 years.

Stanweld Shareholders Made Offer—Shareholders of the Standard Welding Co., Cleveland, O., have received an offer from Borton & Borton, investment bankers, to purchase the property of the company at a price that will net them between \$244 and \$245 a share. The assent of 90 per cent of the total outstanding stock is necessary to close the deal.

Steele Moves Up—M. A. Steele, former manager of the Henney Buggy and Stephens Motor branches of the Moline Plow Co., Freeport, Ill., has been appointed general sales manager of the Stephens Motor branch with headquarters at Moline, Ill. H. J. Leonard, who has been assistant manager, succeeds Steele at Freeport.

New Managers for Chevrolet—Norman Devaux, formerly sales manager of the Chevrolet Motor Co. in California, has been promoted to the position of general manager of that branch. R. C. Durant, formerly assistant sales manager, succeeds him. T. L. Coleman, formerly of the Goodyear Tire and Rubber Co., New York, becomes sales manager of the Chevrolet Motor Co. of Canada, Oshawa, Ont., to succeed H. Horsman, who recently resigned.

Ford to Peerless Motor Car Co.—R. P. Ford, designer and sales engineer of ball bearings, has joined the truck sales organization of the Peerless Motor Car Co., Cleveland, O.

Three Companies Consolidate—The Perfection Tire and Rubber Co., Fort Madison, Ia., will consolidate with the Perfection Tire and Rubber Co., Ltd., and the Champion Auto and Equipment Co.

Gilchrist with Baltimore Maxwell—Albert S. Gilchrist has been appointed manager of the Maxwell Motor Sales Corp., Baltimore, Md., a branch of the Maxwell Motor Co., Detroit, Mich. He succeeds L. A. Tilley, who resigned.

Livingstone Maxwell Cleveland Manager—J. Livingstone has been appointed manager of the Cleveland retail branch of the Maxwell Motor Co. Mr. Livingstone was formerly assistant branch manager for the Studebaker Corp. at Indianapolis and Omaha.

Distributor Gets Trainload of Haynes—With a single trainload of fifty cars of Haynes cars, the Haynes Automobile Co., Kokomo, Ind., set a high mark for shipment to a single distributor last week. The consignment of motor cars went to the Haynes agency at Kansas City. Half of the trainload of five and seven-passenger Haynes touring cars

went to fill waiting orders, and the remainder has been immediately contracted for.

Caplan and Corn Form Corporation—I. R. Caplan, formerly with the R. I. V. Co., New York, and Belmont Corn, formerly purchasing agent for the F. I. A. T. Co., Poughkeepsie, have organized the C. & C. Corp. to act as purchasing agent in America for European motor car builders, furnishing parts and accessories from the American market.

Dudley Federal Advertising Manager—Lynn B. Dudley has been made the advertising manager of the Federal Motor Truck Co., Detroit, Mich. He succeeds George W. Cushing, who recently resigned to join the advertising staff of the Hudson Motor Car Co. Mr. Dudley was formerly connected with the Campbell-Ewald Co., advertising agents.

Hertzog Goodyear Washington Manager—A. E. Hertzog, manager of the Baltimore branch of the Goodyear Tire and Rubber Co., Akron, O., has been appointed manager of the Washington branch of the company and will take care of the territory in both sections. L. J. Gemmil, who was manager of the Washington branch, will look after all of the government business exclusively.

Gets Coveted Massachusetts Tag—For the last few weeks there has been rivalry in Massachusetts as to who would get license No. 100,000, and many motorists were seeking it. The highway commission gave it to James M. Linscott, New England agent for the Reo, who wanted it for his personal car because his dealer's number ever since he went into business years ago has been 010.

Packard Dealer Congressman—Alvan T. Fuller, who handles the Packard line in Eastern New England from Portland, Me., to Providence, R. I., has been elected to Congress from Massachusetts. His victory was a remarkable one, for he entered the fight at the last minute as an independent against Congressman Ernest Roberts, who had served 18 years, and was intrenched in a strong Republican district so that Democrats did not put up a man to oppose him. As Congress is

Dividends Declared

Federal Rubber Co.—The Federal Rubber Co., Milwaukee, Wis., has declared a dividend of \$1.75 a share on second preferred, payable November 25.

Maxwell Motor Co.—The Maxwell Motor Co., Detroit, has declared the regular quarterly dividend of 2½ per cent on common stock, payable January 2 to stock of record December 11.

White Co.—The White Co., Cleveland, O., has declared a quarterly dividend of \$1 a share on an 8 per cent per annum basis. The dividend is payable December 31 to stock of record December 15.

very evenly divided now it is expected Mr. Fuller's vote will be a factor in deciding who is to be speaker of the house.

K. C. Gets Form-A-Truck Branch—The Smith Form-A-Truck Co., Chicago, has established a branch in Kansas City under the direction of F. J. Line, city manager. Increase in sales has made it necessary to establish more branches to keep up with the work.

New Jordan Agency Formed—The McCurdy-Brainard Company, Philadelphia, has been formed to handle the Jordan car in Pennsylvania, New Jersey and Delaware. The company is headed by Robert P. McCurdy, formerly Pierce-Arrow agent in Pittsburgh.

United Motors Buys Harrison Co.—The United Motors Corp., Detroit, has purchased the Harrison Mfg. Co., Lockport, N. Y., manufacturer of radiators. This brings the total United Motors purchases up to eight companies: the Hyatt, New Departure, Delco, Remy, Perlman, Klaxon, Brown-Line-Chapin and Harrison.

Wilson on Tire Reorganizing—A reorganization of the Wilson Tire and Rubber Co., Springfield, Ill., is now in process. W. W. Gardner, treasurer of the company, has resigned and it is stated that E. W. Wilson, president and chief promoter of the company, will be succeeded by a new president at the next meeting of the board of directors.

Farrington on Pacific Coast—Dick Farrington, formerly advertising and publicity manager of the Gibson Co., Indianapolis, Ind., has assumed a similar position with the Chanslor & Lyon Co., San Francisco, Cal. In his new connection Farrington will have charge of the advertising and publicity for the San Francisco headquarters and the seven branches of the company in coast cities.

Holihan Completes New Plant—The Holihan Mfg. Co. has just completed its new plant on the 3½ acres of land recently purchased. The main building is 80 by 400 feet, of the latest construction and includes steel and glass windows and a monitor roof. In addition a steel storage structure 65 by 45 feet, and a shipping shed 65 by 45 feet with floors raised to car level are in process of completion. The capital stock has been increased to \$135,000, and the board of directors was increased by the

election of Henry J. Meir, of Donaldson & Meir, and S. E. Ferris, of H. W. Noble & Co.

Whitman to National Vehicle Co.—F. H. Whitman has been appointed production engineer for the National Motor Vehicle Co., Indianapolis. Mr. Whitman was formerly connected with Dodge Bros.

O'Connor Returns from Australia—N. E. O'Connor, of the service department of the Maxwell Motor Co., has returned to Detroit after a 3-months' trip in Australia and New Zealand.

Dazey Joins Chalmers—Ray Dazey has joined the Chalmers Motor Co. to take charge of the department that publishes the various house organs. Mr. Dazey was formerly with the Packard Motor Car Co. in the sales promotion department.

National Carbon to Add—The National Carbon Co., Cleveland, O., soon will erect new factory buildings costing \$1,000,000. The company has just bought a parcel of land across Berea Road from the present carbon plant. This 63-acre tract has a frontage of 3,368 feet.

Bartholomew to Add—In line with the general policy of the Bartholomew Co., Peoria, Ill., maker of the Glide car, to concentrate the manufacture of its entire car in its local plant, it will add to its plant for the purpose of building its motors. The company has used the Rutenber motor.

McQuay-Norris Salesmen in Conference—The McQuay-Norris Mfg. Co., St. Louis, Mo., had its salesmen in conference last week. There were twenty-three members of the sales staff present at the conference, comprising the branch managers and the mechanical engineers of the sales staff. They came from all sections of the country, including cities on the east and west coast and the Gulf.

New Plant for Saxon—The Saxon Motor Car Corp., Detroit, Mich., is beginning the erection of a new plant on 40 acres of land recently purchased. The first unit will be 1,262 by 240 feet and will have 500,000 square feet of floor space, and will house several departments so grouped that a motor car will move steadily forward from one end of the building to the other for assembly construction. Progressive manufacturing and assembling will be employed in every department possible. Incoming material will be moved by traveling cranes and elevators to the

stockrooms, and a system of conveyors is planned by which stock will be carried to the different manufacturing departments. The first unit will be completed May 1, and the remainder of the buildings June 1, 1917.

Little to Willys-Overland Factory—Herbert W. Little has been transferred to the Willys-Overland factory. Mr. Little was formerly the service manager for the company in the New England states. He will be succeeded by F. H. White.

Earle & Boggs to Represent Fuller Co.—Earle & Boggs, New York, have been appointed eastern representatives of the Fuller & Sons Mfg. Co. in Rhode Island, Connecticut, New York, Pennsylvania, Maryland, Delaware and the District of Columbia.

Milburn Branch Manager for Hupp—E. W. Milburn has been appointed branch manager of the Hupp Motor Car Corp. at San Francisco. He succeeds E. A. Morrison. Mr. Milburn was formerly the coast representative for the Thomas B. Jeffery Co.

Canadian Officer Visits Detroit—W. Owen Thomas, international engineer and recently superintendent of mechanical construction for the Canadian army and a lieutenant at the war front in Europe, is now in Detroit, having been discharged from a hospital. Mr. Thomas was wounded through the explosion of a shell. It is his plan to locate here with his brother, T. R. Thomas, probably as consulting engineer. Thomas designed the Moline-Knight motor, the Brewster-Knight motor the original Willys-Knight and others.

Six Concerns Join Organization—Six new concerns have been admitted to membership in the Motor and Accessory Manufacturers. With these, the total membership is 260. The new members are: Walker Mfg. Co., manufacturer of accessories, Racine, Wis.; Becker Bros., manufacturers of brushes for starting motors, lighting generators, and magnetos, Chicago; Bay State Pump Co., manufacturer of engine-driven tire pumps and piston packings, Boston; Universal Motor Products Co., manufacturers of all-season Sedan tops for moderate-priced cars, Indianapolis; Ericsson Mfg. Co., manufacturer of ignition apparatus, "Berling" magnetos, Buffalo; Craftsman Motor Corp., manufacturer of quick-detachable wire wheels and motor car heaters, Chicago.

Akron, O.—Service Auto & Machine Co.; capital stock, \$2,500; to operate a garage and repair shop; incorporators, James Daugherty, Albert A. Smyers, E. D. Whorley, Raymond Roderick and B. J. Amer.

Albany, N. Y.—Electrical Automobile Sales Corp.; capital stock, \$10,000; incorporators, J. E. Purcell, F. H. Parcells and G. Tiernan.

Albany, N. Y.—Walden W. Shaw Corp.; to manufacture motor cars, aeroplanes and taxis; capital stock, \$1,100,000; incorporators, Richard P. Lydon, R. L. Redfield and Luke V. Albert.

Bridgeport, Conn.—Raybestos Co.; to make motor cars and accessories; capital stock, \$1,500,000; incorporators, S. Simpson, L. V. Simpson and H. G. Farwell.

Buffalo, N. Y.—Superior Rubber Co.; capital stock, \$25,000; incorporators, George J. Hagmaier, Anaby V. Furnell, William E. Standley, Edward Heer, Joseph Porzel, Elmer H. Hagmaier and Frank A. Abbott.

Beaumont, Tex.—Quick Tire Service Co.; capital stock, \$5,000; incorporators, F. Aitken, Alex Feigleson and Charles T. Butler.

Chicago, Ill.—Roamer Motor Car Co.; capital stock, \$25,000; incorporators, A. C. Barley, C. Y. Kenworthy and W. F. Mayer.

Cincinnati, O.—Dixie Auto Supply Co.; capital stock, \$5,000; incorporators, L. R. Wise and B. S. Butterfield.

Cincinnati, O.—Cincinnati National Sales Co.; motor cars; capital stock, \$10,000; incorporators, Charles Hemmer, Thomas E. Byrne, William J. Byrne, James B. O'Donnell and Walter C. Taylor.

Dover, Del.—Esmeralda Oil Corp.; capital stock, \$1,000,000; incorporators, J. T. McGovern, J. G. Gregg, Alva Collins.

Dallas, Tex.—Lexington Motor Co.; capital stock, \$10,000; incorporators, Joseph Goldberg, Samuel Goldberg and George L. Horn.

Dover, Del.—Templar Motors Corp.; to engage in the manufacture and sale of motor vehicles of all kinds; capital stock, \$5,000,000; incorporators, H. E. Latter, N. P. Coffin, C. M. Egnor and G. T. Maxwell.

Dover, Del.—Pittsburg Visible Spark Plug Mfg. Co.; to manufacture, sell and deal in spark plugs for internal combustion engines; capital

Recent Incorporations

stock, \$50,000; incorporators, W. B. Winloft and C. H. Jones.

Evansville, Ind.—International Rubber Sales Co.; to buy, sell and repair motor car tires; capital stock, \$10,000; incorporators, Marc Wile, L. B. Wile and A. D. Rogers.

Fort Worth, Tex.—Velle Motor Sales Co.; capital stock, \$5,000; incorporators, R. C. Velle, David Velle and B. F. Brewer.

Green Bay, Wis.—Nu-Way Puncture Cure Co.; to manufacture and market a fibrous compound for sealing punctures in motor car and cycle tires; capital stock, \$20,000; incorporators, R. C. Moore, J. J. Wirtz and Frank Kaup.

Houston, Tex.—Levand Automobile Co.; capital stock, \$4,000; incorporators, M. Levand, C. C. Geissman and L. G. Riddle.

Houston, Tex.—Robertson & Pearson, Inc.; to buy and sell motor cars; capital stock, \$10,000; incorporators, H. L. Robertson, Raymond Pearson and H. B. Finck.

Houston, Tex.—Texas Motor Equipment Co.; capital stock, \$10,000; incorporators, J. W. Cain, F. H. Littrell and Ben B. Cain.

Lafayette, Ind.—Fowler Auto Co.; capital stock, \$5,000; incorporators, C. R. Rhyne, D. J. Harrington, E. M. Watson, L. C. Redinbo and J. A. Douglas.

Milwaukee, Wis.—Intersection Garage Co.; capital stock, \$5,000; incorporators, Emil E. Drockamp and Hubert J. Lear.

Milwaukee, Wis.—Burnell Fuel Saver Co.; to manufacture carburetion auxiliaries and similar

appliances; capital stock, \$10,000; incorporators, Albert A. Giese and Alfred J. Melms.

Nashville, Tenn.—Stockell Motor Car Co.; to engage in general motor car business; capital stock, \$35,000; incorporators, W. F. Stockell, H. A. Rawlings, A. W. Stockell, Jr., Louis Tillman, G. N. Tillman.

Peoria, Ill.—Kerosene Motor Co.; to sell internal combustion motors, motor parts and all kinds of motor car parts; capital stock, \$100,000; incorporators, E. H. Smith, George McFarland and Frank H. Bush.

Pittsburgh, Pa.—McCurdy-Brainard Co.; incorporators, R. P. McCurdy, E. H. Brainard, E. C. McCurdy and J. J. Brainard.

Portland, Ind.—Hudson-McConochy Co.; to sell motor cars; capital stock, \$10,000; incorporators, S. E. Hudson, L. W. Hudson and Homer McConochy.

Reno, Nev.—Olympic Garage Co.; capital stock, \$100,000; incorporators, R. W. Poole, W. E. Pruett and J. W. Burrows.

San Antonio, Tex.—National Rubber Co.; capital stock, \$15,000; incorporators, W. I. Gross, Rudolph Gross and Carl Hogelselb.

St. Louis, Mo.—Northern Motor Co.; to manufacture and deal in motor cars and parts; capital stock, \$6,500; incorporators, Charles Moench, Lena B. Krite and Alma M. Whittaker.

St. Louis, Mo.—Turner Tire Co.; to manufacture vehicle tires; capital stock, \$13,000; incorporators, E. E. Turner, Charles Neimeyer, N. W. McLeod, H. V. Stevens and S. T. G. Smith.

St. Paul, Minn.—Security Mortgage Co.; to finance the sale of trucks and motor cars on the payment plan; capital stock, \$1,000,000; incorporators, J. N. Storr, A. Hirschman, N. P. Rogers and G. N. Michaud.

Toledo, O.—Erie Auto Engineering Co.; to deal in motor car accessories; capital stock, \$10,000; incorporators, John H. Yonker, Finley Kemp, J. C. McFellim, Wm. Rentschler and W. S. Thurstin, Jr.

Trenton, N. J.—Deltire Rubber Co.; capital stock, \$25,000; incorporators, Alexander Trapp, John R. D. Bower, Catherine P. Hornyak.

Wichita, Kan.—Wizard Auto Lite and Supply Co.; capital stock, \$4,000; incorporators, George H. Bassett, J. H. Travis and J. E. Cook.

From the Four Winds

CAR for Each Thirteen—Houston, Tex., claims proportionately more cars than any southern city. The population is given as 150,000, and the number of cars 11,500, or one machine for every thirteen inhabitants.

Daily Bread Given by Truck—Four 2-ton motor trucks deliver bread daily for a Philadelphia company, the Moore Bread Co. None of the trucks works Sunday, but other days 369 miles are covered. Two trucks average 98 miles a day, and the third averages 97, while the fourth makes 76. In a month one of the trucks averages 2,470 miles covered, 780 stops made and 117,000 loaves delivered. The trucks are Pierce-Arrows.

Steamships Have Garages—A marine garage with a capacity of forty cars and a direct entrance in the forward hold level with the dock, so that machines may be driven in as easily as in a garage on terra firma is an innovation by the Great Northern-Pacific Steamship Co. on its two giant turbine ships, the "Great Northern" and "Northern Pacific." The former method of loading motor cars into the ship's hold by sling and tackle often damaged the car finish and fenders.

Oregon Begins 1917 Registration—Registration of the 1917 series for motor vehicle licenses in Oregon opened November 15, and blank applications approximating 42,000 have been mailed by the secretary of state. The new application is simplified. The name of the applicant is written but once. One item of data has been added, asking whether the vehicle is new or has been used. Under a ruling of the state department it is useless to ask for any certain tag number, as no plates will be reserved.

Nash to Pay by Check—C. W. Nash, president and general manager of the Nash Motors Co., Kenosha, Wis., is about to introduce an innovation by paying every employee of the company by bank check instead of in cash, which has been the rule in Kenosha industries. The underlying reason for the change is to get the money paid for labor started in the right direction—to the bank. Another reason is, manufacturers take long chances by transporting huge sums in coin between banks and payroll windows. To encourage thrift, however, is the main reason.

Students Visit Plants—The motor car and truck industry will furnish the principal places of observation this year for the group of nearly 100 students of the University of Wisconsin, which left last week on the annual electrical and mechanical engineering inspection tour of the East and Middle West. Among the shops which will be inspected during the course of the next fortnight are: Hudson and Ford, Detroit; Pierce-Arrow and Curtiss, Buffalo; Willard Storage Battery, Jordan and White, Cleveland; Mitchell and Case, Racine; A. O. Smith and Cutler-Hammer, Milwaukee.

Non-Stop Car Is Released—The Maxwell non-stop car, which for an infraction of the customs laws of the Canadian government was seized and held for nearly 2 months, has been released by the collector of customs at Vancouver, B. C., and returned to the Maxwell Sales Corp. of the Pacific coast. Two months ago when the car crossed the international boundary at Blaine, Wash., it did so under the charge of representatives of the Maxwell Motor Sales Corp., the latter being engaged in piloting the car over a proposed military defense highway on the Pacific slope. The occupants registered themselves as tourists and as such were permitted the freedom of Vancouver. The next morning the path-

finders were haled before the customs officials, the car was seized by the Canadian government and ever since a legal battle has been waged for the release of the car.

Registration Returns from Washington—Official figures from the secretary of state of Washington show that 65,666 licenses have been issued since March 1, the beginning of the motor car registration year.

Tacks Hold Up Jersey Motorists—Some person sowed broadcast a lot of long, sharp-pointed tacks on the 3-mile stretch of road between Freehold and Hightstown, N. J., and as a consequence twenty-five cars at one time were held up by punctures.

To Have State Gasoline Station—The state of Ohio is going to have its own gasoline station. It will be located at the office of the board of administration at Columbus, and prisoners from the penitentiary are building it. The tank will hold 500 gallons, and employees of the board who have machines and managing officers of state institutions, who use their machines for state business,

will get their gasoline directly from the board, a close account being kept of the amount used. Heretofore the policy has been to make a separate charge and order every time gasoline was purchased for the employees, and full price was paid. The state, by having its own filling station, will be able to make purchases in large quantities and thereby effect a saving.

Pittsburgh Postoffice Motorizes—Trucks ranging in size from $\frac{1}{2}$ to 2 tons have supplanted horse-drawn vehicles and will now carry mail between the central postoffice and carrier stations, railroad stations and collection boxes in Pittsburgh. At present, forty-two trucks are in use.

Cream and Black for 1917—Delaware's 1917 license tags have been received by the secretary of state and will be ready for issuance to car owners by December 1, though they cannot be used until January. This year's tags are green and white, but the new tags will be cream colored numerals on a black background.

Wisconsin Absorbs 35,000 in Year—The state of Wisconsin has absorbed approximately 35,500 motor cars from November 1, 1915, to November 1, 1916, judging from the report of the motor registry office of the secretary of state. On November 1 this year 115,118 cars had been registered by private owners, compared with 79,700 on the same day a year ago. This is an actual gain of 35,418, and nearly 5,500 more licenses issued than estimated at the beginning of the year.

Allen Car's Engine Runs Ferris Wheel—For several seasons now a Ferris wheel has turned at the bidding of an engine originally part of an Allen motor car. H. Wertalla, who runs such wheels at fairs and expositions through the Western states, changed the engine from the motor car chassis to a portable engine frame and mounted a governor on the generator shaft to control the speed. A special water supply was provided. The motor has given no trouble, though it has been moved once about every 10 days during the last 2 years.

New Ruling on Drivers' Licenses—The motor vehicle commissioner of New Jersey, William L. Dill, has made a new ruling in regard to the renewals of drivers' licenses. Heretofore it has been necessary for every driver to show a license for the previous year when making an application for a new license or else take the regular examination before the state inspectors. The commissioner has changed this so that the possession of a license with the last 3 years entitles the applicant to obtain his license without further examination.

Duluth Raises \$10,000—Duluth has completed its campaign for \$10,000 as its share of the Duluth-Twin City highway fund. Minneapolis, St. Paul and Pine county each pledged similar amounts, making a total donation of \$40,000, which will be added to the \$40,000 appropriated by Pine county, \$60,000 appropriated by the state highway commission and \$137,000 to be asked from the federal government. It is planned to spend approximately \$300,000 on the Twin City roadway next year, giving a stretch of 160 miles connecting the three cities. Every dealer organized a special team to aid in the campaign. The team was known by the car the dealer handles, and a banquet is to be given in honor of the captains by officials of the local branch of the Duluth-Twin City Highway Association.

Coming Motor Events

RACES

—1916—

- † November 30—Speedway, Los Angeles, Cal.
- November 30—Speedway, Unlontown, Pa.
- * December 25—Speedway, Los Angeles, Cal.

—1917—

- May 19—Metropolitan Trophy, New York speedway.
- † May 30—Indianapolis speedway.
- † June 9—Chicago speedway.
- June 23—Cincinnati speedway
- † July 4—Omaha speedway.
- † July 14—Des Moines speedway.
- † July 28—Tacoma speedway.
- August 4—Kansas City speedway.
- † September 3—Cincinnati speedway.
- † September 15—Providence speedway.
- † September 29—New York speedway.
- October 6—Kansas City speedway.
- October 13—Chicago speedway.
- October 27—New York speedway.

* Sanctioned by A. A. A.

† A. A. A. championship events for 1917.

MEETINGS

- December 7-9—Annual convention, Safety First Federation of America.
- January 9-11—Mid-winter meeting, Society of Automobile Engineers.

SHOWS

- December 2-9—Springfield, Mass., show.
- December 7-9—Pasadena, Cal., show.
- December 18-20—San Francisco show.
- December 30-January 6—Cleveland, O., show.
- January 2-10—Salon, Hotel Astor, New York.
- January 6-13—New York show.
- January 9-10—Fort Dodge, Ia., show.
- January 13-27—Montreal, Can., show.
- January 13-20—Montreal show.
- January 20-27—Detroit show.
- January 22-27—Oklahoma City show.
- January 22-27—Rochester, N. Y., show.
- January 23-27—Baltimore show.
- January 27-February 3—Chicago show.
- January 29-February 3—Buffalo show.
- February 3-10—Minneapolis show.
- February 10-17—San Francisco show.
- February 12-17—Kansas City show.
- February 18-25—St. Louis, Mo., show.
- February 19—Pittsfield, Mass., show.
- February 19-24—Des Moines, Ia., show.
- February 19-24—Duluth, Minn., show.
- February 26-March 3—Omaha, Neb., show.
- March 3-10—Boston show.
- March 6-10—Fort Dodge, Ia., show.
- March 14-17—Davenport, Ia., show.
- March 14-17—Mason City, Ia., show